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RELATIONSHIP BETWEEN HOLLAND VOCATIONAL INVENTORY SCORES AND PERFORMANCE MEASURES OF HIGH SCHOOL STUDENTS.

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THE PURPOSE OF THIS STUDY WAS TO IMPROVE THE PREDICTION OF A STUDENT S PERFORMANCE IN A SPECIFIC HIGH SCHOOL. THREE HYPOTHESES WERE STRUCTURED (1) THE GREATER THE CONGRUENCE BETWEEN A STUDENT VOCATIONAL PREFERENCE INVENTORY (VPI) PROFILE AND THE OVERALL GRADE LEVEL PROFILE, THE BETTER IS THE STUDENT S ACADEMIC ACHIEVEMENT AND BEHAVIOR AS MEASURED BY UNEXCUSED ABSENCES AND DISCIPLINARY REFERRALS, (2) THE GREATER THE CONGRUENCE BETWEEN A STUDENT VPI PROFILE OF THE CURRICULUM IN WHICH HE IS ENROLLED, THE BETTER IS THE STUDENT S ACADEMIC ACHIEVEMENT AND BEHAVIOR AS MEASURED BY UNEXCUSED ABSENCES AND DISCIPLINARY REFERRALS, AND (3) THE PERFORMANCE OF A STUDENT IN A CLASSROOM IS RELATED TO THE STUDENT S VPI PROFILE AND TO TEACHER RATINGS OF STUDENT CLASSROOM BEHAVIOR. THE DESIGN INVOLVED THE COLLECTION OF POPULATION-WIDE DATA FOR SIX PUBLIC SCHOOLS, THREE LOCATED IN MARYLAND AND THREE LOCATED IN GEORGIA. ANALYSES WERE CARRIED OUT AT THREE LEVELS CHOSEN TO COINCIDE WITH THE GRADES 10, 11, AND 12. IN GENERAL, CORRELATIONAL AND DISCRIMINATORY STATISTICAL TECHNIQUES WERE UTILIZED FOR ALL DATA ANALYSIS. RESULTS WERE SUMMARIZED BY HYPOTHESES. THE FIRST HYPOTHESIS WAS SUPPORTED BY THE EVIDENCE. THE SECOND HYPOTHESIS EVIDENCE WAS SUGGESTIVE, BUT NOT CONCLUSIVE. EVIDENCE CONFIRMED THE THIRD HYPOTHESIS AND SUGGESTED SOME OF THE DYNAMICS UNDERLYING REWARD IN THE CLASSROOM. (HB)

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SECTION I

PROBLEM AND RELATED RESEARCH

A. Introduction

Recent attempts to identify poorly adjusted students have focused on school and general environmental factors in an attempt to discover correlates of "deviant" behavior. While important insights into the problems of school adjustment have been gained by this procedure, failure to base research investigations on general theoretical constructs has produced a body of research only loosely related internally and lacking a systematic orientation toward explaining mechanisms underlying deviant behavior.

The AERA Committee on the Criteria of Teacher Effectiveness had the following to say about the lack of theory in educational research:

> By disorganization, we mean the condition in which, at present, research too often proceeds without explicit theoretical framework, in intellectual disarray, to the testing of myriads of arbitrary, unrationalized hypotheses. The studies too often interact little with each other, do not fall into place within any scheme, and hence add little to the understanding of the teaching process (AERA, 1953, p. 657).

N. L. Gage recently made the following statement concerning educational research on teaching:

> Our concern with theories and paradigms is, therefore, aimed at furthering more systematic and orderly approaches to the formulation of the variables and hypotheses that enter into research on teaching (Gage, 1963, p. 102).

The research described in this project is directed toward the application and evaluation of a theoretically based method for studying factors leading to and maintaining student behavior in the school environment. The theoretical framework, or model, underlying this project is a synthesis of concepts taken from a number of different areas. The major contributors are reinforcement psychology, organization theory from sociology, and measurement theory. The concepts from organization theory which have proved useful in this research framework are presented in a particularly relevant way by Carlson (1964).

Carlson discusses the relationship between a service organization and its clients. He looks at this relationship in terms of the freedom that an organization has in selecting its clients and the freedom that a client has in participating in an organization, and identifies four types of service organization/client relations:

Type I--organizational control over admission, client control over own participation in organization.

Type II--organizational lack of control over admission, client control over own participation in organization.

Type III--organizational control over admission, client lack of control over own participation in organization.

Type IV--organizational lack of control over admissions, client lack of control over own participation in organization.

Public schools are characterized by type IV. They do not have any choice as to students and their service is mandatory for most students (for students sixteen and over, if not by law, usually by parents).

In referring to the differences between type I and type IV organizations, Carlson refers to a type IV organization as "domesticated" and type I as "wild." The "domesticated" organization, in contrast to the "wild" organization, has no struggle for survival; there is always a steady flow of clients. Funds are available regardless of quality. Society protects its domesticated organizations, whereas the "wild" organizations must produce or cease to exist. Therefore, in order to exist, the "wild" organization must be able to quickly adapt to its environment in contrast to the protected "domesticated" organization which adapts more slowly. These type IV organizations have objectives but since their clients are unselected, they are not always as successful in fulfilling these objectives as may be desired. Therefore, adaptive responses are made by the organization in order that it may better achieve its objectives.

Carlson mentions two types of adaptive responses which public schools make because of the problem of unselected clients: segregation and preferential treatment.

An example of segregation is when one part of the school program, such as the vocational or business curricula, serves as a place where students can be assigned to remove them from the main program. Segregation can also result in goal displacement. This happens when the main goal is completely or partially abandoned for a different goal. Hollingshead (1949) gives an example of possible goal displacement. He reports that in a particular school, teachers discuss grades with the parents of upper and middle class children and discuss discipline with parents of lower class children, although the lower class children have lower grades. Goal displacement has occurred in this school if curtailing discipline problems is more important than learning.

It is, therefore, important to consider the characteristics of the clients, since they will affect the adaptive responses made by the organization. For example, in a school where the majority of students are highly intelligent, behavior associated with college entrance may be emphasized more than in a school serving a low socio-economic area. A student who is bright, creative, and independent would probably find many rewards in the first school but few rewards in the second because in the second school, through goal displacement, discipline and conformity are rewarded more highly than creativity and achievement.

It is also well known that preferential treatment is given in many schools to upper and middle class children. In discussing these two adaptive responses Carlson states:

> The mechanisms of segregation and preferential treatment in Type IV organizations seem to make the organization-client relationship more tolerable from the point of view of the organization. Through these mechanisms the organization is able to exercise a form of subtle internal selection and sorting of clients as it goes about rendering its service. It is the argument that these mechanisms are adaptive, that they enable the protection of the valued resources of the organization and, therefore, are functional in goal achievement. In the case of the public school, this means that segregating certain students protects teaching time by removing from the main stream the disruptive elements of unselected clients. And, giving partial treatment to some students protects teaching time in the sense that it channels teaching time and professional attention in general to those students for which the school is geared to supply the most adequate service. Together, these mechanisms facilitate the fulfillment of the goals to which the school commits itself (Carlson, 1964, pp. 272-3).

Whether these adaptations are bad is not the question of this study. This study was concerned with the possibility of improving the prediction of student performance by taking into consideration whether a student in a school is likely to be hindered or helped by his school's adaptive responses.

So far only the adaptive responses of the organization have been considered. It seems logical that the student can also have adaptive responses. Among the possible types of adaptive student responses are: receptive adaptation (no conflict with school), drop-out adaptation (total withdrawal from school), situational retirement (physically, but not mentally, present), rebellious adjustment (rejection of school responses), and side payment adaptation (put up with academic work for side payment such as playing on the school football team).

Since the objective of this study was to improve the prediction of a student's performance in a specific high school, then according to the organizational theory just presented, it is important to obtain some measure of a school's likely adaptation responses, and some identification of those students who are most likely to be discriminated against by these adaptation responses. It would be these students who would have the most difficult time keeping their school performance up to their capabilities.

The assumption is made that those school adaptation responses which most of the school staff support are those most likely to be manifested by students. It is further assumed that those adaptation responses which an individual student does manifest are a function of that student's past experience, motivation, personality, and abilities, and also a function of the characteristics of the student body; i.e., its general ability level, motivation, and other traits. If we consider these factors, we are, in effect, studying the reinforcement, or reward, structure of the school. This reinforcement structure for the individual student is set up and maintained by behavior on the part of other individuals within the school (i.e., students, teachers, and administrators).

It must also be considered that each individual student develops general reinforcement, or reward, expectancies (types of behavior which usually bring reward) as a result of factors internal and external to the school environment. These reward expectancies are assumed to be a function of such factors as past experience, motivation, personality, and aptitude. There is, of course, a large amount of literature in experimental psychology dealing with the effects upon behavior of human subjects of manipulating reward contingencies. The focus of this investigation, however, was on factors operating in an intact, natural environment. If the reward expectancies which the individual student brings to the school are in conflict with the existing reinforcement structure within the school, two general classes of resolutions are open: (1) the student's expectancies are modified by school-related outcomes so that a greater congruence is obtained; or (2) the student's expectancies remain in conflict with the school reinforcement patterns. That is, some students bring to the school expectancies which are easily modified by in-school experiences and result in "adjustment," while other students possess expectancies so dissimilar to the reinforcement structure operating in the school that adjustment is difficult or impossible.

Investigation of existing patterns of reinforcement and of student reward expectancies represents a major field for research. In this study, a technique for providing information on both reinforcement structure and student reward expectancies was investigated. This technique involves the use of an occupational preference instrument, a modified version of Holland's Vocational Preference Inventory (VPI). In the succeeding parts of this section, the theoretical basis for the use of VPI in this project is given, and the VPI is described in some detail.

B. Theoretical Basis of the VPI

Occupational preferences reveal a variety of information. John Holland states: "The choice of an occupation is an expressive act which reflects the person's motivation, knowledge, personality, and ability" (Holland, 1958, p. 336). He theorizes that occupations represent a way of life, and an environment rather than a set of isolated work functions or skills. In other words, according to Holland, to work as a carpenter means not only to use certain tools but also to have a certain status, community role, and a special pattern of living. Therefore, the choice of an occupational title represents various kinds of information: the student's motivation, his knowledge of the occupation in question, his insight and understanding of himself, and his abilities.

If occupational choices are used to give this type of information, as they were in this study, then one assumption made is that the individuals making the occupational choices (students and school staff members) tend to see occupations and occupational titles in stereotyped ways. The following studies support this assumption.

Haire and Grunes (1950) gave high school students a few, rather neutral, facts about a fictitious person, and also his occupation, and asked the students to guess the sort of person he was. Their guesses were coded for content and compared with descriptions obtained from similar subjects when the occupation was omitted from the given facts. Differences between the two sets of descriptions revealed stereotypes associated with the occupations selected for study.

In a study by Grunes (1957), approximately 150 students representing high schools in communities varying widely in size, social class, race, and degree and type of industrialization were tested for the purpose of revealing the way occupational titles tend to be grouped by high school students. Grunes reports that "despite the class, sex, and regional differences mentioned, in general the students seem to agree rather closely in their basic perceptual structure concerning occupations" (1957, p. 91). A study by Holland (1963b) gives additional support for this assumption.

The development of the Vocational Preference Inventory by Holland was based on a theory of occupational choice (Holland, 1959, 1962) in which interaction between the individual and his physical and social environment plays a central role. Specifically, Holland states:

> Out of his experience he develops a hierarchy of orientations for coping with environmental tasks; this hierarchy may be referred to as the pattern of personal orientations. Each of these orientations is related to a particular physical or social environment and to a particular set of abilities. The person making a vocational choice in a sense "searches" for those environments which are congruent with his personal orientations (Holland, 1962, p. 1).

Another way of stating this is that people will search for an environment that is congruent with their reward expectancies. Holland (1962) has shown that college students who obtained a high score on one of the six main scales of the

Vocational Preference Inventory tended to choose similar major subject areas. In the same study, it was also shown that groups of National Merit Scholars who were high scorers on the same VPI scale also tended to make similar choices of famous people whom they emulated. When these same students were asked to give self-ratings on traits and skills, a significant relationship was found between student types and the traits and skills named.

C. The Vocational Preference Inventory

Since this investigation relied heavily upon responses to a modified form of the Vocational Preference Inventory, the characteristics of the original instrument are presented in some detail below.

The VPI, as developed by Holland, is a personality inventory composed entirely of occupational titles on which the individual indicates those occupations he likes and those he dislikes. The sixth revision of the VPI permits the same form to be used regardless of the sex of the respondent. The total inventory has eleven scales: Realistic, Intellectual, Social, Conventional, Enterprising, Artistic, Infrequency, Self-Control, Masculinity, Status, and Acquiescence. The first six scales are personality types and were of primary interest in this study. The following is Holland's description of each of these six types:

1. Realistic--this model type is masculine, physically strong, unsociable, aggressive; has good motor coordination and skill; lacks verbal and interpersonal skills, prefers concrete to abstract problems, conceives of himself as being aggressive and masculine and having conventional political and economic values. Laborers, machine operators, aviators, farmers, truck drivers, and carpenters resemble this type.

2. Intellectual--task oriented intraceptive asocial. Prefers to think through rather than to act out problems, needs to understand, enjoys ambiguous work tasks, has unconventional values and attitudes. Physicians, chemists, mathematicians, biologists represent this type.

3. Social--this type is sociable, responsible, feminine, humanistic, religious, needs attention, has verbal and interpersonal skills, avoids intellectual problem solving and physical activity. Social workers and teachers resemble this type.

4. Conventional--this type prefers structured verbal and numerical activities and subordinate roles. Is conforming and is effective in well structured tasks. Identifies with power and status. Bank tellers, secretaries, bookkeepers and file clerks represent this type.

5. Enterprising--this type has verbal skills for selling and for dominating and leading other people; conceives of himself as a strong masculine leader and avoids work which requires long periods of intellectual effort. Differs from the conventional type in that the enterprising type prefers ambiguous social tasks and has a greater concern with power, status, and leadership. Salesmen, politicians and business executives resemble this type.

6. Artistic--this model is asocial, avoids problems which are highly structured or require gross physical skills. He is more feminine and has

> less ego strength, prefers dealing with environmental problems through self expressions in artistic media. Musicians, artists, poets, sculptors, and writers represent this type (Holland, 1963c).

A pilot study to investigate the applicability of the VPI to normal high school students (grades 9-12) has been carried out by the principal investigators.* Utilizing factor analytical techniques, it was found that the VPI scales could differentiate among the six types of high school students identified on the basis of an outside criterion. These results were consistently obtained for each grade level from 9 through 12.

From a research point of view, the VPI offers certain unique advantages when dealing with public school situations. Holland states:

> The neutral content of the inventory and its form give it the following desirable properties: (1) Occupational titles provide subtle stimuli which elicit positive interest and avoid the negative reactions sometimes provoked by "obvious" personality inventories and projective devices with excessive ambiguity and threat. (2) Occupational content reduces the subject's need to 'fake' since this kind of content is usually perceived as having no relation to personal adjustment. Test users can avoid requests for personality interpretations which normally come on the heels of the administration of obvious personality inventories, since all subjects see the VPI as a 'vocational test.' Typically, subjects are satisfied with conventional 'interest' interpretations

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*Data are available from Dr. Norman Uhl at Emory University.

> of the first six scales. And (3) the VPI provides at low cost a broad range of reliable information about a subject in a brief testing and scoring time without the need for special scoring or data processing equipment. It is unlikely that the VPI has more validity than comparable inventories; instead its chief value is its economical use of time and money (Holland, 1965, p. 1).

The reliabilities of the six scales as reported in the manual for the sixth revision (Holland, 1965, pp. 9-10) are given in Table 1.

TABLE 1

INTERNAL CONSISTENCY AND TEST-RETEST RELIABILITIES FOR THE VPI SCALES

Scale	College Freshmen (KR #21) Males (N=6289)	College Freshmen (KR #21) Females (N=6143)	College Freshmen test-retest (1 year, N=26)
Realistic	.85	.77	.86
Intellectual	.89	.89	.65
Social	.84	.82	.76
Conventional	.87	.83	.61
Enterprising	.83	.76	.71
Artistic	.88	.88	.73

Several construct validity studies with the VPI have been performed (Holland, 1960, 1962, 1963a). Intercorrelations among the California Psychological Inventory, Minnesota Multiphasic Personality Inventory, Sixteen Personality Factor

Questionnaire, and the VPI scales have supported the construct validity and meaning attributed to the VPI scales. Additional correlations have been obtained between the VPI scales and a student's rating of his own personal traits and abilities, life goals, values and his self characterization in an adjective check list (Holland, 1962, 1963c, 1965).

Astin (1963) and Astin and Holland (1961) used the constructs for the six scales to assess college environments. They found that they could predict what students say about their college by taking a census of major fields at a college. They assumed that choice of major field was equivalent to choice of vocation.

D. Application of the VPI in this Study

Students attending a public high school are not able to select their particular high school. Using Carlson's method of classification, the high school is a type IV institution. The students attend their high school whether or not its reinforcement structure is congruent with their reward expectations.

No single high school can serve all its students equally well. Relative degrees of congruence will exist between any single individual's reward expectancies and the school's reinforcement structure. As was previously stated, it is assumed that the reinforcement structure of a school is determined by the personalities and abilities of the school staff and the student body. Therefore, by comparing VPI scores characteristic of the school staff and of the student body, estimates of the reinforcement structure of the school can be obtained. An individual student's VPI profile was used as an estimate of his reward expectancies. The greater the congruence between the two, the less difficulty a student would have in performing commensurate with his capabilities. The less the congruence, the more difficulty a student will have in performing at his capacity.

Holland agrees with the assumption that VPI scales indicate an individual's favored methods of adjustment. He states:

> . . . peaks reveal the person's favorite methods whereas low points indicate the rejected methods of adjustment. Or, peaks may represent desirable roles and situations and, low points, threatening or distasteful roles and situations (Holland, 1965, p. 3).

The underlying assumption is that occupational groups provide different types of satisfactions and require different abilities, attitudes, and values. There are many studies (Darley, 1938; Terman, 1954; Sternberg, 1955; Garmen and Uhr, 1958; and Holland, 1958, 1960, 1962) which support this assumption concerning the relationship between vocational choice and personality variables.

The purpose of this study was to investigate the usefulness of VPI typings for identifying senior high school students whose reward expectancies are not congruent with the predominant reinforcement structures of the school environment. Since the theoretical basis for typing individuals on the VPI is based on the congruence between individual reward expectancies and reinforcement structure of different environments, since previous research by Holland and others has established the validity of the VPI scales for a variety of educational and background criteria, and since the VPI typing has been shown to be feasible at the high school level, it was desirable to investigate the validity of the VPI for identifying students in senior high school who are apt to have varying degrees of adjustment difficulty.

SECTION II

OBJECTIVES AND HYPOTHESES

The theoretical basis of the VPI centers on the interaction between an individual and his environment. In a specific situation, such as a school, the VPI permits an assessment of the congruence between an individual student's reward expectancies and the reinforcement structure characteristic of the school environment. The general research hypothesis of this study was: the greater the congruence between a student's reward expectancies as measured by his responses to the VPI and the reinforcement structure of his school, the better the student will perform in that environment as measured by academic achievement (adjusted for intelligence score) and school behavior.

Differences in school environment may exist at a number of different levels within any one school. The levels that were investigated in this study are: grade levels; school curricula, such as college preparatory, general and commercial; and the individual classroom. The reinforcement structure of the environment at each level was assessed and compared with the reward expectancies of individual students that are part of each environment. It was predicted that for each environment at each level, the greater the degree of similarity between the reinforcement structure and student expectancies, the more positive the academic and behavioral performances of the student would be.

The general hypotheses investigated at each level were:

1. The greater the congruence between a student VPI profile and the overall grade level profile, the better is the student's academic achievement (measured by quality point average with the regression of intelligence scores removed) and behavior as measured by unexcused absences and disciplinary referrals.

2. The greater the congruence between a student VPI profile and the profile of the curriculum (college preparatory, general, etc.) in which he is enrolled, the better is the student's academic achievement (as measured by quality point average with the regression of intelligence scores removed) and behavior as measured by unexcused absences and disciplinary referrals.

3. The performance of a student in a classroom (as measured by quality point average with the regression of intelligence scores removed) is related to the student's VPI profile and to teacher ratings of student classroom

behavior. Also, the student's ratings of his classroom teacher are related to his performance in the classroom and to the teacher's ratings of him.

SECTION III

PROCEDURES AND INSTRUMENTATION

In this section, details of the research plan are described. The general strategy of the study involved collection of personality and performance data for entire high school populations; the variables chosen for measurement were selected on the basis of their relevance for testing the theoretical reward expectancy framework developed in Section I of this report. The subparts of this section describe: (A) the selection, modification, and development of the data collection instruments; (B) the nature of the school populations involved in the study; (C) the operational procedures for data collection; and (D) the general plan for data analysis.

A. Development of Instruments

The primary research instrument was a modification of the Sixth Revision of the Holland Vocational Preference Inventory (VPI). The VPI suggested itself as a potentially useful instrument in this study for two major reasons: (1) the scales for occupational typing (i.e., Realistic, Intellectual, Social, Conventional, Enterprising, and Artistic) had considerable face validity for classifying students with respect to their expectations concerning the world of work. Since a high school student must make decisions about his future occupational role, and since the seriousness of these decisions is heavily stressed in the school and home during this period of the youth's life, it is reasonable to assume that his preferences among available occupations reflect his expectancies with respect to one of life's most reward-laden aspects. The degree to which these reward expectancies also operate in the environment of the school was the primary empirical question underlying this research project; and (2) the VPI is non-threatening and non-controversial since the student response is merely an expression of like or dislike for occupational titles; thus, it was believed that cooperation from public school officials could be gained rather easily for mass testing with the instrument.

In addition to the six occupational typing scales, the VPI contains a number of other scales which have interpretations primarily of a clinical nature. A modified form of the Sixth Revision was produced by including only those items which were keyed on the six occupational typing scales. This resulted in a shortened form with 104 items.* A second modification involved dropping the middle, or neutral, response category and making the response a forced choice between "liking" and "disliking." The elimination of the middle, neutral response was based on the empirical observation during a pilot study mentioned in Section I that proportionally very few neutral choices were recorded by high school students responding to the instrument. Since data collection, instructions, and scoring were simplified by dropping the neutral response, this modification was introduced into the revised form of the VPI used in this study. In this report, the acronym "VPI" will be used to refer to the revised form (Appendix A contains the modified VPI).

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*Only 84 of these items were keyed; the first 10 and final 10 items were included to prevent the student from discovering the keying pattern in the items.

Earlier versions of the VPI included separate forms for male and female respondents. The Sixth Revision, however, was a combined form with all of the items drawn from previous male forms. Since limited data were available on the new form from the test publishers, a small group of adult male and female education students was tested with the VPI for the sole purpose of determining whether sufficient positive choices would be given by females to occupational titles largely associated with male roles. The sample, an intact group of graduate students in a lecture section of an Educational Measurement course, was comprised of 44 females and 35 males. The mean number of positive choices (i.e., "likes") for the females was 40.8, while for the males it was 42.1. These numbers obviously do not differ sufficiently to cause suspicion about the relative frequency of choices by females on the combined form of the VPI.

The items on the modified form of the VPI were arranged so that the items keyed on each of the six personality types occurred in cycles of six items. Since the first ten and last ten items were "dummies," this meant that items 11, 17, 23, 35, 41, 47, 53, 59, 65, 71, 77, 83, and 89 were on the Realistic Scale; similarly, items 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, 78, 84, and 90 were on the Intellectual scale. The first and last items keyed on the remaining scales were: 13 and 91 for the Social scale; 14 and 92 for the Conventional scale; 15 and 93 for the Enterprising scale; and 16 and 94 for the Artistic scale. For each scale, the score of a student for that scale was simply the number of relevant items marked as "liked" by the student. Thus, each scale score could range from 0 through 14.

The modified VPI form was designed for administration to entire school populations. In addition to the VPI item responses, population-wide data were collected from available school records concerning intelligence test scores, first semester school achievement (i.e., quality point average), number of unexcused absences, and number of disciplinary referrals within the school. The latter three measures represented criterion measures and are traditional measures of a child's success in school. The intelligence test data were compiled to serve as control and adjusting information in several of the data analyses.

Besides the mass testing of school populations, a limited number of intact classrooms was selected for more intensive analysis. Due to the nature of the instruments utilized in these classrooms, participation in this phase of the study was drawn from volunteer teachers. Two behavior rating scales were used in the selected classrooms. The first, the Pupil Classroom Behavior Scale (PCBS), was an available instrument. The PCBS was developed under auspices of the Maryland Center of the Interprofessional Research Commission on Pupil Personnel Services (IRCOPPS) and represents an extension and modification of the Bowers Rating Scale. It consists of 24 behavior-descriptive statements, each with a five point rating scale, and is completed by a classroom teacher. In responding to the PCBS, the teacher rates each student in his or her class separately on each of the 24 items. Since the PCBS was developed for use on the elementary school level, it was reviewed for appropriateness for use at the high school level. The only necessary revision involved rewording item 18, changing the word "play" to "engage in activities."

Previous factor analytic studies of the PCBS* have revealed that 23 of the 24 items can be adequately accounted for by three orthogonal factors. These 23 items are keyed to form subscores corresponding to the three factors (achievement orientation, socio-academic creative, and socio-cooperative). These factor-based scores have face validity for use in the present project since they summarize the teacher's assessment of the overt classroom behavior of his or her students. The strong evaluative content of the teacher's ratings suggests that they reflect classroom expectations which a teacher sets for his or her students. The PCBS and its scoring key are presented in Appendix B.

While the PCBS taps the teacher's expectations of students, no available instrument seemed uniquely suited for the reciprocal purpose; that is, the assessment of student's expectations of teachers. Since this was critical for the purpose of the project, an instrument for student rating of teachers was constructed. This instrument, called the Maryland Instrument for Student Rating of Teachers (MISROT, see Appendix C) was constructed on the basis of a logical analysis of the behavior of a teacher in a classroom. A pool of behavior-descriptive items was developed and subjected to content review. A final selection of 42 items was made and all items were worded so that agreement with the item represented the socially desirable norm. The test format was a five point rating scale. The MISROT was viewed as an exploratory instrument in this project since it was not possible to carry out extensive trial prior to use in the project. The empirical structure of the MISROT derived from use in this project was considered to serve as a possible source of revision, although these data would only affect future applications of the MISROT.

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*Unpublished results, obtained by personal communication with IRCOPPS personnel.

B. School Populations

Due to the different institutional alliances of the co-investigators for this project, school populations were selected from both the states of Maryland and Georgia. Within the framework of this study, each school was considered to be a separate replicate of the basic research design. From one point of view, the choices of schools should not be critical since, if the reward expectancy model has validity, it should be testable in any school environment (within rather broad limits). On the other hand, for demonstration purposes, relatively heterogeneous student populations within a school would seem to present more opportunity for display of differential effects. On this basis, the schools chosen were each of moderate size and contained a typical, wide range of student talent and interest. In Maryland, the initial search for cooperating schools began at the county level since school districts are on a county basis in Maryland. Two counties were selected since they afforded a total of three relatively comparable high school populations. The three cooperating schools in Georgia were all in the Atlanta Public School system and were, within themselves, relatively comparable. Below, descriptive sketches of the six project schools are presented:

> Maryland School 1 (M1)--Located between Baltimore, Maryland and Wilmington, Delaware in a town of approximately 6,000 population; total school enrollment about 600 in grades 10-12; a wide socio-economic and cultural range due to the mixture of rural and commuter, white-collar and professional groups in the community served by this school.
>
> Maryland Schools 2 and 3 (M2 and M3)--Located in a rural fringe of the Washington, D.C. suburbs; total student enrollments in grades 10-12 approximately 600 and 1,100, respectively; a wide socio-economic and cultural range is represented in the communities served by these schools; the areas are rapidly developing ones, but the schools have a conservative, rural history.
>
> Georgia Schools 1, 2, and 3 (G1, G2, and G3)--Located in Atlanta, Georgia, a cosmopolitan area of approximately 1,175,000 people; total enrollment per school (grades 8-12) is about 1,000; a wide socio-economic and cultural range is represented in the communities served by these schools.

Within each school, two volunteer teachers were sought for participation in the classroom level data collection. Due to the necessity for cooperating teachers, it was not possible to obtain a representative cross-section of subject-matter, grade levels, etc. A summary of characteristics of these classrooms is presented below:

> Maryland School 1, Classroom 1--12th grade, Problems of Democracy--described as low track with a mixture of curriculum majors; total number of students was 30, with 19 males and 11 females.
>
> Maryland School 1, Classroom 2--12th grade, English; described as high track with academic curriculum students only; total number of students was 27, with 17 males and 10 females.
>
> Maryland School 2, Classroom 1--10th and 11th grade, Geometry; academic and general curriculum students; total number of students was 31, with 17 males and 14 females.
>
> Maryland School 2, Classroom 2--12th grade, Social Studies; contained a mixture of curriculum majors; total number of students was 36, with 18 males and 18 females.
>
> Maryland School 3, Classroom 1--10th, 11th, and 12th grade, Geometry; academic and general curriculum students; total number of students was 34, with 19 males and 15 females.
>
> Maryland School 3, Classroom 2--11th grade, History; general and business curriculum students; total number of students was 35, with 13 males and 22 females.
>
> Georgia School 1, Classroom 1--12th grade, English; college preparatory curriculum majors; total number of students was 34, with 18 males and 16 females.

Georgia School 1, Classroom 2--10th and 11th grade, English; college preparatory majors; total number of students was 29, with 18 males and 11 females.

Georgia School 2, Classroom 1--11th grade, English, general curriculum majors; total number of students was 31, with 16 males and 15 females.

Georgia School 2, Classroom 2--11th grade, Second Year Algebra, general curriculum majors; total number of students was 22, with 16 males and 6 females.

Georgia School 3, Classroom 1--11th grade, American History; class described as slow learners, business curriculum majors; total number of students was 16, with 10 males and 6 females.

Georgia School 3, Classroom 2--12th grade, English; class described as slow learners, business curriculum majors; total number of students was 21, with 19 males and 2 females.

C. Data Collection Procedures

For ease of processing, all data were collected on IBM optical scan answer sheets from which punched cards can be produced directly through an IBM 1232 optical page reader and an IBM 534 card punch. The administration of the VPI was scheduled as mass testing; certain schools utilized their public address systems and a research assistant read directions into the classrooms, while in other schools written directions were furnished each teacher to read to his or her class. In both cases, the classroom teachers proctored the administration. In other schools, students were brought to central testing facilities (e.g., the cafeteria or auditorium) and the research assistant, with teacher proctors as aides, administered the VPI in a face-to-face situation. A liberal time limit of from 30 to 40 minutes was established and no student failed to complete all items in the time allowed, the majority finishing in 15 to 20 minutes. Teachers and other staff members associated with the 10th, 11th, and 12th grades either completed the VPI during this testing period in the school or at a more convenient time for them during the day.

The VPI answer sheets were also used to encode intelligence test scores, and the criterion variable data for the students. Clerks transcribed these data from school records and encoded them in vacant spaces on the answer sheets.

The additional data for the two special classrooms per school were collected under close supervision by a research assistant. Students completed the MISROT while only the research assistant was in the room and the answer sheets were collected and placed in sealed envelopes so that no opportunity for teacher examination of these documents was possible. Teachers completed the PCBS at their leisure and these were collected by a research assistant.

Due to variations in school practices and to certain practical complications, the data from some schools were not complete. These deficiencies, as well as some differences among the variables in the different schools, are summarized in Table 2.

TABLE 2

SUMMARY OF DATA COLLECTION FOR SIX PROJECT SCHOOLS

School Code[a]	Student VPI	Staff VPI	Intelligence Test	Achievement Measure	Disciplinary Referrals	Unexcused Absences
M1	Yes	Yes	CTMM	0-100 scale	Yes	Yes
M2	Yes	Yes	CTMM	0-100 scale	Yes	[c]
M3	Yes	Yes	CTMM	0-100 scale	Yes	Yes
G1	Yes	Yes	Otis[b]	0-4 scale	Yes	Yes
G2	Yes	No	Otis[b]	0-4 scale	Yes	No
G3	Yes	Yes	Otis[b]	0-4 scale	Yes	Yes

[a] The letter represents the state, Maryland or Georgia, and the number is the school within the state.

[b] The Otis Quick Scoring Intelligence test.

[c] Total absences were reported rather than unexcused absences.

D. Data Reduction Procedures

All data reduction and statistical analysis were accomplished by electronic tabulating and computing equipment. Responses to the VPI, PCBS, and MISROT, as well as the additional variables, were encoded directly on optical scan answer sheets. Once punched cards were produced, scoring programs were utilized. While a program was available for scoring the

PCBS, original programs were produced to score the VPI and MISROT. Copies of the scoring programs are displayed in Appendices D and E. A Biomedical Program Library program (BMD02D) was used to generate summary statistics and intercorrelations for scores from the various instruments. Several additional Biomedical Program Library programs were utilized for factor analysis (BMD03M), multiple correlation (BIMD29), canonical correlation (BMD06M), and multiple discriminant analysis (BMD05M). An original program was developed to compute profile scores (Appendix G). Details of the plan of data analysis, as well as results of this analysis, are presented in Section IV.

SECTION IV

ANALYSIS AND RESULTS

The reward expectancies which influence a student's behavior may manifest themselves at a number of different levels. A student is similar in many respects to those in the same grade level in school that he has attained. In general, students in the same grade have spent the same total number of years in school and are administratively and socially distinguished as a sub-unit within the school environment. Thus, in this section we report results based on grouping students in terms of their grade level in school. A second dimension along which students are categorized in high school is the type of curriculum they choose (or are persuaded) to pursue. Again, students within an academic program, or students within a vocational program, are similar with respect to educational goals they have chosen and are administratively distinguished within the school. For this reason, some analyses were carried out for the various curricula in the schools. The third level of analysis concerned students in selected classrooms. These students are, of course, exposed to common experiences in the classroom and form a social and administrative school unit. This project was limited to these three levels of analysis. Students are similar, or different, along a very large number of dimensions and it was decided to consider only those characteristics which represent primary administrative divisions within a high school. This is not, of course, meant to deny the probable significance of comparisons involving, say, sex, socio-economic level, age, etc. Rather, as a first focus for research on the reward expectancy model, the use of ordinary administrative levels was considered to offer a good opportunity to demonstrate effects which might well be further analyzed at other levels in future studies.

In this project, each school was considered to be a separate replicate of the basic research design. Thus, in general, no among-school comparisons were made. This strategy was employed in order to lend greater generality and creditability to the results. Very often in educational research, a project is restricted to a single replicate of the research plan on one population. Thus, any peculiarities of the population or any unexpected, and perhaps undetected, biasing conditions operating on the population are completely confounded within the analysis. A research finding deserves general acceptance only after it can be reliably demonstrated on a variety of occasions. For this reason, this project was designed with considerable internal replication on distinct populations.

Before presenting the details of the analyses, a comment on the general interpretation of the statistical procedures utilized is called for. All statistical procedures were basically correlational (e.g., multiple correlation, canonical correlation) or classificatory (e.g., discriminant analysis) in nature (Anderson, 1958; Cooley and Lohnes, 1962; Rao, 1952). Results for appropriate hypotheesis tests based on these statistics are reported, and these tests of inference are intended to be aids in interpreting results. However, all computations are based on entire populations of scores and the derived measures (e.g., correlation coefficients) are population parameters. Thus, the meaning of any statistical test of hypothesis in this context must be carefully interpreted. If we reject a null hypothesis which postulates a 0 correlation between two variables, this may be interpreted as meaning that we do not accept the possibility that the scores, from which the correlation coefficient was computed, have arisen by a random sampling process from a bivariate (or multivariate) population of such scores. We know this, however, without the statistical test since the computed correlation is the population correlation. Thus, the only value of performing the statistical test is to compare our population result with a hypothetical random sampling procedure and the expected results from this hypothetical procedure. Accepting a null hypothesis merely means that if random sampling had been employed, the observed result would not be an unusual one. It is felt that reporting the statistical tests has some merit from this limited interpretive point of view.

The three paper-and-pencil instruments, the VPI, MISROT, and PCBS, were each scored by special scoring programs. The problem of omitted responses was taken into account for each instrument. Generally, the proportion of students omitting even one item was quite small and the cases of multiple omits were rare enough so that very little data had to be discarded. For example, in the three Georgia schools a total of 148 students completed the MISROT. A total of 13 students omitted one or more items; however, 9 of these were single omits, 2 involved two to four omits, and 2 had sufficiently numerous omits that they were removed from the data. Thus, the less was less than 1.5%. For the cases containing occasional omits, strategies were built into the scoring procedures for filling in the blank responses. For the VPI, this consisted of scoring the item as a "like" response. For the MISROT and PCBS, due to the small numbers of total cases, the data were visually scanned for omits and the nearest integer response to the average for a given subscoring category for the given student was inserted for omits. While the above strategies could, if widely employed, lead to bias in the resulting scores, the small proportions of cases requiring insertion of arbitrary values indicate that this was not a serious problem in this project.

A second kind of lost data involved those students who, for one reason or another, did not provide complete sets of data. In general, students absent on testing days were followed-up only in a limited fashion by the cooperating schools. Thus, about 2 or 3% of a total school population was lost for this reason. Also, in some cases, school records did not yield intelligence test scores or data on criterional variables. In one school the loss from this source ran about 10% for each of the three grade levels. On the other hand, in another school, virtually complete data were available for all students. Again, the loss from this source is probably not serious since it is unlikely that the students for whom data were lacking were similar in any way that would bias the outcome of the analyses. That is, the loss is undoubtedly random with respect to the experimental comparisons.

A. Grade Level Analyses

The aim of the analyses performed at this level was to determine the degree to which information from the VPI can be used to predict student performance on traditional measures of success in school (i.e., unexcused absences, disciplinary referrals, and quality point average). In the analyses, criterional differences which could be attributed to student intelligence were taken into account by appropriate inclusion of intelligence test score data.

The numbers of students upon which the analyses were performed were, generally, constant for all comparisons. The one exception involved the discriminant analyses in which extreme groups of students, drawn on the basis of the various criterion variables, were utilized. Table 3 summarizes the numbers of students and staff in the various school populations.

1. Validation of Profile Scoring Procedures

Since the VPI yields scores concerning the student's preferences on six personality typings, an attempt was made to combine this information into a single profile score per student. In previous studies (e.g., Holland, 1962), only the dominant type(s) exhibited by the student has been utilized. It was suspected that the entire profile of six

TABLE 3

NUMBERS OF STUDENTS AND STAFF IN THE POPULATIONS

School and Grade[a]	Number[b]
G10	150
G11	141
G12	159
Staff	40
G20	139
G21	128
G22	140
Staff	None tested
G30	203
G31	223
G32	171
Staff	40
M10	223
M11	176
M12	165
Staff	14
M20	262
M21	198
M22	189
Staff	18
M30	320
M31	380
M32	399
Staff	34

[a] The letter represents the state, Maryland or Georgia; the first digit represents the school, and the second digit the grade, with 0 for 10th, 1 for 11th, and 2 for 12th.

[b] In each case, the number presented is the total number for whom usable VPI answer sheets were available; the numbers of staff tested in Maryland schools 1 and 2 were rather small and not a complete sampling of the staff in these schools; the relatively larger numbers in Georgia schools 1 and 3 resulted since administrators, counselors, etc., in addition to classroom teachers, were included.

scores would provide additional predictive information by serving to differentiate among students within a single dominant type. A total of four profile scores was computed and used in subsequent comparisons with criterion variables. These four profile scores involved two different computational approaches each based on two different comparison profiles. The two computational approaches were: (1) the product-moment correlation, with algebraic sign, between the six scores for a given student and scores on a comparison profile; and (2) the square of the generalized Euclidian distance between the six scores for a given student and a comparison profile. If X_{ij} represents the i^{th} score for student j on the VPI and if Y_i is the i^{th} comparison score, then the square of the generalized distance may be written $\sum_i (X_{ij}-Y_i)^2$; it is, in effect, the Pythagorean theorem applied in a 6-dimensional space. The two comparison profiles were: (1) the means of the six scores for all students in one grade level; and (2) the means of the six scores for all staff in the school. The mean VPI scores per grade per school are summarized in Table 4. The four profile scores per student are denoted:

RS -- product-moment correlation of six VPI scores for one student with means for the six scores for all students in same grade.

TABLE 4

MEAN VPI SCORES FOR STUDENTS AND STAFF

School & Grade	Realistic	Intellectual	Social	Conventional	Enterprising	Artistic
G10	2.44	2.68	3.81	3.03	3.77	2.95
G11	2.55	3.48	4.38	3.33	3.83	3.45
G12	3.60	3.84	5.16	4.18	4.99	4.27
Staff	2.88	6.45	7.40	3.42	5.28	6.70
G20	2.51	2.70	3.22	2.86	2.91	2.68
G21	2.95	2.59	3.70	2.76	3.30	2.55
G22	2.53	2.46	3.79	3.04	3.13	2.80
Staff	None tested in this school					
G30	2.00	2.80	3.89	2.15	2.99	3.61
G31	2.62	3.71	4.60	2.86	4.35	3.85
G32	3.59	3.99	5.09	3.20	5.46	4.58
Staff	3.22	5.62	6.82	2.72	4.58	6.22
M10	4.02	3.79	4.55	3.87	4.18	3.96
M11	5.03	5.17	4.89	3.73	4.31	4.63
M12	4.55	4.02	5.13	4.61	4.77	4.48
Staff	2.93	7.71	8.00	4.36	5.86	9.57
M20	3.05	3.81	4.04	2.55	2.98	3.22
M21	3.04	3.71	4.86	3.49	3.83	4.09
M22	3.90	3.90	5.30	3.22	4.03	3.83
Staff	2.67	5.17	7.94	3.78	5.17	5.00
M30	3.19	4.10	4.38	2.76	3.52	3.32
M31	3.42	3.61	4.36	2.81	3.89	3.63
M32	3.47	3.60	4.74	3.20	3.99	3.63
Staff	2.53	5.29	7.56	3.29	4.94	6.94

DS -- generalized distance of six VPI scores for one student from means for the six scores for all students in same grade.

RT -- product-moment correlation of six VPI scores for one student with means for the six scores for all staff in the school.

DT -- generalized distance of six VPI scores for one student from means for the six scores for all staff in the school.

The intercorrelations among the four profile scoring procedures varied widely from school to school and across grades within schools. Table 5 summarizes these correlations.

The correlational and distance scores were generally negatively correlated, as one would expect. For most schools, the RS and RT values were moderately correlated, although in a few instances these correlations reached very high levels (e.g., in Maryland School 2, grade 11 the correlation was .99). Also, it is interesting to note that for Maryland School 1, the correlation of RS and RT was particularly small. In this school, incomplete sampling of staff may be responsible for the low correlation.

To assess the validity of these profile scoring procedures, the multiple correlation between the set of criterion measures (with and without intelligence test scores included) and each profile score was computed. This is, of course, the reverse of the usual direction of prediction, but

TABLE 5

INTERCORRELATIONS OF PROFILE SCORES

School & Grade	RS vs. DS	RS vs. RT	RS vs. DT	DS vs. RT	DS vs. DT	RT vs. DT
G10	-.14	.41	-.25	-.02	.28	-.44
G11	.03	.78	-.36	.15	.52	-.38
G12	-.09	.56	-.56	-.27	.05	-.72
G20	.05					
G21	-.18	(Not available since there were no VPI data for this school)				
G22	-.06					
G30	.04	.95	-.57	.10	.33	-.56
G31	-.06	.85	-.39	.05	.76	-.36
G32	-.22	.69	-.39	-.02	.84	-.46
M10	-.11	.34	-.22	-.07	.24	-.66
M11	.03	.23	-.12	.11	.49	-.66
M12	-.25	.05	-.07	-.01	.36	-.78
M20	.04	.77	-.41	.00	.41	-.64
M21	-.10	.99	-.61	-.08	.71	-.60
M22	-.15	.89	-.56	-.06	.74	-.60
M30	.10	.71	-.38	.02	.43	-.65
M31	.01	.73	-.50	.03	.46	-.67
M32	-.09	.85	-.62	-.02	.55	-.68

the multiple R is non-directional with respect to prediction and provides a useful index of the magnitude of the relationship between each profile score and the set of criterion variables. Table 6 summarizes these results. Three features of these multiple correlations are immediately apparent. First, the profile scores based on generalized distance are consistently worse predictors than those based on product-moment correlations; that is, RS and RT are generally larger than DS and DT. Also, the RS and RT values generally reach significance at beyond the .01 level, whereas the DS and DT values rarely reach significance at the .05 level. These different results may be explained by the fact that RS and RT values contain information concerning both magnitude and algebraic sign of the congruence between student and comparison profile; the DS and DT values only indicate magnitude of congruence.

A second feature of the multiple correlations is the consistently larger values for RT when compared with RS. Apparently, the student's congruence with a measure of official school expectancies predicts his success better than does his congruence with his classmates. The difference between RS and RT values ranges from -.12 to +.16 and the differences in magnitudes of coefficients of determination range from 0 to .09.

TABLE 6

VALIDITY COEFFICIENTS[a] FOR PROFILE SCORES

School and Grade	IQ in Criterion Set				IQ not in Criterion Set			
	RS	DS	RT	DT	RS	DS	RT	DT
G10	(24)	(12)	29	30	24	(12)	29	29
G11	27	(09)	33	(08)	24	(09)	31	(08)
G12	27	(11)	40	(15)	27	(11)	35	(02)
G20	26	(14)	b	b	25	(12)	b	b
G21	(16)	(13)	b	b	(16)	(12)	b	b
G22	29	29	b	b	29	29	b	b
G30	35	(11)	38	25	28	(10)	32	24
G31	41	(07)	46	22	32	(06)	40	22
G32	29	(10)	31	(09)	24	(10)	22	(08)
M10	28	28	30	(20)	(16)	25	30	(18)
M11	34	(10)	43	31	31	(10)	37	27
M12	34	(22)	34	(16)	27	(14)	32	(16)
M20	32	(10)	20	(11)	29	(06)	20	(11)
M21	45	(20)	47	29	44	(07)	47	28
M22	(16)	(13)	(21)	(18)	(16)	(10)	(20)	(17)
M30	22	(10)	(16)	(13)	22	(09)	(16)	(09)
M31	17	(05)	32	22	16	(05)	32	20
M32	25	(13)	37	(13)	25	(12)	37	(13)

[a] Decimal points omitted. Values in parenthese are non-significant at the .05 level; underlined values are significant at the .01 level; others are significant at the .05 level.

[b] Not available since staff did not complete VPI in this school.

The third feature arising in the multiple correlation data involves a comparison of values when intelligence data were included and when intelligence data were not included in the criterion set. The proportion of variance in profile score values explained by differences in intelligence ranged from 0 to 16% (see Table 7). In general, with intelligence

TABLE 7

PROPORTION OF VARIANCE IN PROFILE SCORES EXPLAINED BY INTELLIGENCE

School and Grade	RS	DS	RT	DT
G10	.00	.00	.00	.00
G11	.01	.00	.01	.00
G12	.00	.00	.09	.02
G20	.00	.00	[a]	[a]
G21	.00	.00	[a]	[a]
G22	.00	.00	[a]	[a]
G30	.10	.00	.12	.00
G31	.14	.00	.16	.00
G32	.04	.00	.07	.00
M10	.03	.04	.00	.00
M11	.02	.00	.10	.03
M12	.06	.04	.01	.00
M20	.02	.01	.00	.00
M21	.01	.04	.01	.01
M22	.00	.00	.00	.00
M30	.00	.00	.00	.01
M31	.00	.00	.00	.01
M32	.00	.00	.01	.00

[a] Not available since staff did not complete VPI in this school.

data in the criterion set, this increase was small and not statistically significant, but in individual cases it reached significant proportions.

The magnitudes of the multiple correlations are generally not large and, as a base of comparison, Table 8 presents the zero-order coefficients for intelligence test scores and quality point average. These values usually exceed the corresponding multiple correlations of the best profile score and the set of criterion variables in each case. These results cast doubt on the predictive utility of the profile scoring procedure, although the comparisons of the different profile scoring systems do throw some light on the source of reward expectancy congruence within a school.

TABLE 8

CORRELATIONS BETWEEN QUALITY POINT AVERAGE
AND INTELLIGENCE SCORES

School and Grade	r	School and Grade	r
G10	.43	M10	.49
G11	.33	M11	.48
G12	.48	M12	.41
G20	.65	M20	.55
G21	.51	M21	.45
G22	.51	M22	.49
G30	.68	M30	.51
G31	.55	M31	.39
G32	.58	M32	.33

In the remainder of the analyses performed at the grade level, information from the six VPI scores was treated together statistically, but no single profile score was utilized.

2. Validation of VPI Scores

The information from the set of six VPI scores can be compared with the set of criterion variables by utilizing canonical coefficients of correlation. In general, only the coefficient from the first canonical function was of interest since the focus of the analysis was on the maximum degree of relationship, and actual prediction based on the regression functions was not carried out. In Table 9 the canonical coefficient for the first canonical function and the variables from set 1 (i.e., the criterion set and intelligence scores) and from set 2 (i.e., the VPI scores) which showed the largest positive and negative loadings, respectively, on the canonical function are reported.

The canonical correlations are clearly of greater magnitude than the best of the corresponding multiple correlations based on the profile scores. Thus, the profile scoring procedure apparently sacrifices considerable information of a predictive nature. The magnitudes of the canonical coefficients indicate that, typically, between 15 and 25% of the variance in set 1 can be accounted for by

TABLE 9

CANONICAL CORRELATIONS OF VPI SCORES AND CRITERION SET WITH INTELLIGENCE INCLUDED

School and Grade	Canonical R	Largest Loadings[a]	
		Set 1	Set 2
G10	.42	+Ach, -Ref	+Soc, -Ent
G11	.47	+Ach, -Ref	+Int, -Real
G12	.47	+Ach, -Ref	+Soc, -Real
G30	.44	+Ref, -Int	+Real, -Int
G31	.49	+Ref, -Ach	+Real, -Int
G32	.41	+Ref, -Abs	+Real, -Int
M10	.36	+Ach, -Abs	+Soc, -Real
M11	.43	+Ref, -Ach	+Real, -Int
M12	.42	+Int, -Int	+Art, -Ent
M20	.40	+Ref, -Int	+Real, -Int
M21	.55	+Ach, -Ref	+int, -Real
M22	.38	+Ref, -Int	+Real, -Int
M30	.29	+Ref, -Ach	+Real, -Int
M31	.50	+Ach, -Ref	+Int, -Real
M32	.43	+Ach, -Abs	+Int, -Real

KEY:

Set 1

Ach = Quality Pt. Av.
Int = Intelligence Score
Abs = Unex. Absences
Ref = Disc. Referrals

Set 2 (VPI)

Real = Realistic
Int = Intellectual
Soc = Social
Con = Conventional
Ent = Enterprising
Art = Artistic

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[a] The first listing in each set is the variable with the largest positive loading on the first canonical function; the second listing is the variable with the largest negative loading. These are not always the two best discriminators, however, since both of the two best predictors could have the same sign.

NOTE: Georgia School 2 is omitted since no absence data were available.

differences in VPI scores. The pattern of loadings on the first canonical function is of interest but, unfortunately, shows no particular constancy across the different schools. However, within a given school, the pattern tends to be relatively constant for the three grade levels. Thus, in Georgia School 3, the largest positive and negative contributors from the VPI are, respectively, Realistic score and Intellectual score. From set 1, the largest positive contributor is consistently number of disciplinary referrals, although the largest negative contributor is different at each grade level. Thus, large numbers of disciplinary referrals are associated with high Realistic scores and low Intellectual scores on the VPI. Generally, the schools showing the greatest constancy of high loading variables are also schools associated with the largest canonical correlations. This suggests that in these schools, for unknown reasons, there is relatively effective communication of the conditions underlying rewarding of student behavior from the school authorities (i.e., teachers, etc.) to the students.

In order to further clarify the predictive ability of the VPI, two additional analyses were conducted with students classified by grade level. The first of these involved defining extreme groups on each of the three criterion variables and investigating the discriminating power of the six VPI scores. Also, intelligence data were used as a supplementary discriminator in a parallel series of analyses. For quality point average, the high and low 25% of the grade level groups were set up as the criterion groups. For unexcused absences and disciplinary referrals, the distributions were extremely skewed with a concentration of scores at 0. For each of these variables, the two criterion groups were, respectively, all students with 0 scores and all students with non-zero scores. Due to the limitations of the computer program utilized for the discriminant analyses, a maximum group size of 150 could be analyzed. For several of the grade levels, random deletion of students from the 0-score group was used to reduce the size of this group to 150.

The results for the criterion variable of quality point average are presented in Table 10. The statistic reported is the total proportion of correct classifications, or "hits," which can be made by computing probabilities of group membership from the loadings on the discriminant functions. That is, the loadings from the first discriminant function were used to compute, for each student, the likelihood that he belonged to group 1. Group 1 was, in each case, the high success group; i.e., the top 25% in quality point average, or the 0 unexcused absences group, or the 0 disciplinary referrals group. If this probability was larger

TABLE 10

DISCRIMINANT ANALYSIS BASED ON QUALITY POINT AVERAGE

			Predictors	
School and Grade	Number in Success Group	Number in Non-success Group	6 VPI Scores Only	6 VPI Scores and IQ
			Proportion of Hits[a]	Proportion of Hits[b]
G10	37	37	.70	.80
G11	35	35	.77	.84
G12	40	40	.74	.82
G20	35	35	.73	.90
G21	32	32	.70	.84
G22	35	35	.69	.81
G30	51	51	.69	.89
G21	56	56	.76	.88
G32	43	43	.71	.86
M10	56	56	.69	.77
M11	44	44	.75	.82
M12	41	41	.70	.83
M20	60	60	.75	.78
M21	50	50	.77	.87
M22	47	47	.62	.80
M30	80	80	.68	.78
M31	95	95	.76	.80
M32	100	100	.74	.80

[a] All values significant at the .001 level except G20, G21, G22 which were significant at the .02 level and M22 which was significant at the .05 level.

[b] All values significant at the .001 level.

than .5, the student was predicted to belong to group 1; if it was less than .5, he was classified in group 2, the low success group. The total proportion of correct classifications, or "hits," is comprised of the students actually in group 1 who were classified by the discriminant function in group 1 and the students actually in group 2 who were classified in group 2.

For the case of the groups based on quality point average, the proportions of correct classifications may be compared with a chance level of .5 since the two groups were of equal size. Due to the unequal group sizes for the unexcused absences groups and the disciplinary referrals groups, the chance proportion of correct classification varies, but is always larger than .5.

The discriminant analysis based on the extreme groups in terms of quality point average showed proportions of correct classifications ranging from .62 to .77 when only the six VPI scores were utilized as predictors. Adding intelligence test score data raised the range of proportion of "hits" to an interval from .77 to .90. The results based solely on VPI scores are of primary interest since they lend considerable evidence to the argument that the personality typing of a student is related to his success in receiving reward in the school environment. The discriminant functions, when tested by means of the Mahalanobis D-square statistic, each achieved significance at the .05 level or beyond. The interpretation of these results is straight forward. The major research hypothesis underlying this project concerned the validity of the VPI personality typing scores for predicting academic criteria. Clearly, with respect to quality point average, the VPI can provide significant discrimination between extreme groups. Thus, the student who achieves in the top quarter of his grade is differentiated by his personality typing from the student in the bottom quarter. Examining the loadings on the discriminant functions (Table 11) reveals that the pattern of leadings favors high Intellectual and Social scores for the high achieving group and high Realistic and Enterprising scores for the low achieving group. Generally, the Conventional and Artistic scores are not reliable differentiators between the extreme achievement groups.

Within the limits of this study, no evidence concerning the precedence of achievement or personality typing can be found. That is, it is not clear whether the personality type of a student influences his behavior in such a way that he tends to achieve well or, alternatively, the attainment of success in school learning results in a distinctive personality type. This is, of course, the perennial chicken-

TABLE 11

DISCRIMINANT FUNCTION COEFFICIENTS FOR VPI SCORES WITH CRITERION GROUPS BASED ON QUALITY POINT AVERAGE

School &	Function 1 Coefficients						Function 2 Coefficients					
Grade	1	2	3	4	5	6	1	2	3	4	5	6
G10	-06	27	26	15	14	17	29	09	00	08	27	26
G11	-03	24	25	12	-04	03	27	00	10	05	26	02
G12	04	14	36	09	13	06	24	14	21	02	26	09
G20	33	20	29	12	00	12	57	12	18	20	19	20
G21	04	12	29	18	07	-02	29	10	10	16	21	13
G22	08	03	26	05	09	-01	42	-07	15	05	11	05
G30	22	19	24	00	17	17	48	-03	16	14	23	14
G31	-12	33	17	-03	23	09	27	04	10	10	11	08
G32	06	16	18	05	23	05	39	03	26	-06	34	04
M10	13	11	28	25	-07	33	43	-07	18	24	-07	39
M11	32	26	29	09	22	18	37	04	32	19	28	04
M12	23	18	43	04	05	15	38	-02	34	04	13	09
M20	21	21	27	01	05	15	49	01	30	-09	26	09
M21	-06	27	17	15	15	09	40	00	07	12	17	08
M22	33	16	34	04	04	07	44	17	32	20	07	02
M30	16	23	25	-04	13	08	31	07	17	08	07	13
M31	06	23	32	24	-06	11	36	02	15	08	18	13
M32	09	17	25	19	12	19	42	-03	24	08	16	10

KEY: (VPI Scale)
1 = Realistic Scale
2 = Intellectual Scale
3 = Social Scale
4 = Conventional Scale
5 = Enterprising Scale
6 = Artistic Scale

NOTE: Decimal point omitted.

and-egg problem. A longitudinal study, covering many earlier years of schooling would throw some light on this dilema, but the high school years are too brief and, probably, too late in life, to study the emergence of personality as far as VPI typing is concerned.

The increase in classificatory prediction afforded by addition of intelligence test data to the VPI scores results in gains in proportions of hits ranging from .03 to .20 (Table 10). The pattern of loadings on the discriminant functions shifts, of course, when intelligence data are added to the VPI scores (Table 12). Intelligence test scores load consistently more heavily for the high achieving group than for the low achieving group. Beyond this, the low group tends to be more heavily weighted on the Realistic score and the high achieving group on the Intellectual score as was true earlier.

The results of the discriminant analyses for the remaining two criterion variables, unexcused absences and disciplinary referrals, reveal less impressive classificatory results. Table 13 summarizes the results for unexcused absences and Table 14 presents similar data for disciplinary referrals. Due to the skewness of the distributions of unexcused absences and disciplinary referrals, the extreme groups consisted of (1) all students with 0 scores, and

TABLE 12

DISCRIMINANT FUNCTION COEFFICIENTS FOR VPI SCORES AND INTELLIGENCE SCORES WITH CRITERION GROUPS BASED ON QUALITY POINT AVERAGE

School &	Function 1 Coefficients							Function 2 Coefficients						
Grade	1	2	3	4	5	6	7	1	2	3	4	5	6	7
G10	00	34	44	36	-11	08	51	37	14	14	29	03	20	44
G11	35	61	11	-32	38	-26	93	61	31	00	-31	60	-29	82
G12	-42	-23	31	51	48	-43	118	-08	-16	19	36	51	-38	100
G20	144	33	12	85	-84	-27	138	148	25	03	86	-56	-13	117
G21	179	-178	114	53	-124	14	190	187	-161	86	42	-96	31	168
G22	147	-22	105	64	-99	-79	137	172	-34	90	65	-94	-61	121
G30	102	40	37	32	18	-39	112	113	14	26	40	24	-33	92
G31	19	40	-04	34	-09	-27	85	53	10	-08	42	-16	-22	71
G32	04	12	20	80	-37	29	75	65	-01	27	57	-17	24	63
M10	43	-55	120	24	-32	07	77	69	-64	99	23	-28	16	67
M11	24	23	12	29	-04	14	38	30	02	18	36	06	01	31
M12	-13	17	76	51	-14	-36	79	08	02	62	42	03	33	66
M20	14	-16	01	34	24	21	51	40	-27	14	17	36	13	41
M21	-50	-19	81	58	-02	-44	57	08	-37	59	44	04	-33	45
M22	87	-06	71	33	-36	-02	42	87	-04	61	48	-27	-09	35
M30	48	-29	39	105	05	-05	102	59	-38	30	103	00	01	89
M31	04	15	39	48	-59	02	70	34	-04	21	29	-28	05	61
M32	-18	06	14	76	-38	13	56	17	-13	14	58	-28	04	49

KEY: 1 = Realistic Scale 2 = Intellectual Scale 3 = Social Scale
4 = Conventional Scale 5 = Enterprising Scale 6 = Artistic Scale
7 = Intelligence Score

NOTE: Decimal point omitted.

TABLE 13

DISCRIMINANT ANALYSIS BASED ON UNEXCUSED ABSENCES

School and Grade	Number in Success Group	Number in Non-success Group	Predictors-6VPI Scores & IQ	
			Proportion of Hits	Significance Level
G10	139	11	.75	ns
G11	130	11	.80	.01
G12	130	29	.58	ns
G30	150[a]	17	.63	ns
G31	150[a]	21	.65	ns
G32	150[a]	6	.76	.05
M10	150[a]	36	.68	.01
M11	123	53	.68	.001
M12	109	56	.61	.05
M20	65	65	.62	.05
M21	50	50	.69	.01
M22	47	47	.67	ns
M30	150[a]	35	.70	ns
M31	150[a]	38	.70	.001
M32	150[a]	50	.71	.001

[a] Size of group reduced to meet computer program limitations.

NOTE: In schools G1, G3, M1, and M3 the extreme groups were: all those with 0 unexcused absences and all those with 1 or more unexcused absences; in school M2 total absences were reported, hence the high and low 25% groups on total absences were used; also, no absence data were available for school G2.

TABLE 14

DISCRIMINANT ANALYSIS BASED ON DISCIPLINARY REFERRALS

School and Grade	Number in Success Group	Number in Non-success Group	Predictors-6 VPI Scores & IQ	
			Proportion of Hits	Significance Level
G10	127	23	.70	.01
G11	110	31	.69	ns
G12	119	40	.71	.01
G20	126	13	.76	.01
G21	110	18	.66	ns
G22	132	8	.74	ns
G30	143	60	.71	.01
G21	150[a]	52	.62	ns
G32	138	33	.71	.01
M10	144	79	.62	ns
M11	111	65	.67	.001
M12	115	50	.59	.02
M20	150[a]	32	.71	.001
M21	150[a]	38	.73	.001
M22	150[a]	19	.73	ns
M30	150[a]	44	.64	.01
M31	150[a]	48	.72	.001
M32	150[a]	38	.78	.001

[a] Size of group reduced to meet computer program limitations.

(2) all students with at least 1 unexcused absence (or disciplinary referral). Maryland School 2 was an exception to this procedure since only total absences were reported. Hence, top and bottom 25% groups were used for Maryland School 2. For the other schools, the two criterion groups were not really "extreme" since virtually all students entered into the analysis. The skewness of these distributions and the inability to set up really extreme groups resulted in a situation in which high levels of discrimination would be difficult to attain. Considering these facts, the relatively large number of significant results is interpreted as favoring the reward expectancy model. For unexcused absences, 9 of the 15 functions reach significance at, at least, the .05 level and the proportions of correct classifications range from .58 to .80. In the case of disciplinary referrals, 12 of 18 functions reach significance at, at least, the .02 level and the proportions of correct classifications range from .59 to .78. Due to the unfavorable classification situation presented by these variables, only the combination of predictors involving the six VPI scores and intelligence test socres was investigated.

In addition to the discriminatory analyses, other evidence of the predictive value of VPI scores for the criterion of quality point average was sought. The extreme group analysis, while yielding useful interpretative information has the disadvantage of not including the entire range of the criterion variable. To better study the functional relationship that exists, the six VPI scores and intelligence test scores were used as multiple predictors and multiple correlation coefficients were computed with quality point average as the criterion. A useful comparison can then be made by also considering the zero-order correlation of intelligence scores and quality point average. Table 15 presents these zero-order correlation coefficients, the multiple correlation coefficients, and the proportion of variance in quality point average accounted for by VPI scores alone. The range of additional predictive variance attained by the VPI scores is from .02 to .19, with the median at about .055. In general, when the zero-order correlation coefficient is large, the VPI does not add substantial new predictive information. In Georgia School 3, for example, all zero-order correlation coefficients were above .55 and the VPI only added between .02 and .07 to the predictable variance in quality point average. On the other hand, in Georgia School 1, the zero-order correlation coefficients were in the .30's and .40's and the new predictable variance accounted for by VPI scores ranged from .09 to .14. If the zero-order correlation coefficients and the gains in

TABLE 15

MULTIPLE CORRELATION COEFFICIENTS OF QUALITY POINT AVERAGE WITH VPI SCORES AND INTELLIGENCE SCORES

School and Grade	r using Intelligence Only	r using Intelligence and VPI Scores	Proportion of Variance Accounted for by VPI Scores
G10	.43	.53	.10
G11	.33	.50	.14
G12	.48	.57	.09
G20	.65	.69	.05
G21	.51	.57	.06
G22	.51	.57	.07
G30	.68	.69	.02
G31	.55	.62	.07
G32	.58	.62	.05
M10	.49	.56	.08
M11	.48	.54	.06
M12	.41	.47	.06
M20	.55	.59	.05
M21	.45	.63	.19
M22	.49	.51	.02
M30	.51	.54	.03
M31	.39	.53	.14
M32	.33	.50	.14

predictable variance are independently ranked, the rank order correlation between them is -.72. From purely a multiple prediction point of view, this relationship is not unexpected since it is known that a "diminishing returns" situation is quickly encountered when attempting to predict academic criteria. On the other hand, the present study used personality measures, the VPI scores, as the predictors in addition to intelligence scores. For this reason, it seems appropriate to suggest that the additional predictable variance attributable to VPI scores is related to the dynamcis of reinforcement conditions within the schools. It is notable that, with the exception of Georgia School 1, the largest correlation between intelligence scores and quality point average occurs at the 10th grade. Hence the maximum contribution of the VPI scores to prediction occurs, generally, at the 11th or 12th grade level. While the trend is not clear-cut in the present data, it appears reasonable to investigate, in future studies, the hypothesis that personality factors contribute more to a student's academic achievement as he progresses into the higher levels of the educational system. Presumably, 12th graders are somewhat intellectually more select than students at lower grade levels. Hence, factors other than sheer intelligence begin to contribute more to individual differences among student achievement as one moves higher up the academic ladder.

B. Curriculum Level Analyses

The analyses performed by student curriculum were combined across the three grade levels in order to ensure large enough groups for meaningful statistical results. The major empirical hypothesis of interest was that the similarity of a student to other students, pursuing the same curriculum as he, can be used to predict that student's school performance. Profile scores (both correlational and distance) were computed for each student with the comparison profile being the mean VPI scores of all other students pursuing the same curriculum. Since most teachers taught courses in more than one curriculum, the same staff profile scores as utilized in the grade-level analyses, were used here. The analysis was restricted to computations of multiple correlations between the profile scores and the set of criterion variables, including intelligence scores, used in the grade-level analyses. Table 16 shows the numbers of students in each curriculum in the six schools. The results of the multiple correlational analyses are summarized in Table 17.

Due to the unequal numbers of students in the various curricula in the different schools, the coefficients reveal less consistent results than occurred when grade levels were analyzed. In general, the correlational profile scores were

TABLE 16

NUMBERS OF STUDENTS IN EACH CURRICULUM

School	Curriculum	Number of Students
G1	College Prep	221
	General	63
	Business	118
G2	College Prep	112
	General	118
	Business	104
G3	College Prep	370
	General	68
	Business	69
M1	Academic	189
	General	213
	Business	86
	Vocational	76
M2	Academic	316
	General	164
	Business	123
	Vocational	46
M3	Academic	463
	General	198
	Business	388
	Vocational	47

NOTE: The total numbers per school do not coincide with those given in Table 3, for the grade levels since the curriculum was not reported for some students.

TABLE 17

VALIDITY COEFFICIENTS FOR PROFILE SCORES

School	Curriculum	RS	DS	RT	DT
G1	College Prep	.30	(.13)	.34	(.13)
	General	(.21)	(.28)	(.19)	(.29)
	Business	.32	(.16)	(.20)	(.17)
G2	College Prep	(.07)	.28	[a]	[a]
	General	.28	(.12)	[a]	[a]
	Business	.33	(.16)	[a]	[a]
G3	College Prep	.30	(.06)	(.33)	(.11)
	General	(.24)	(.15)	.43	(.26)
	Business	.40	(.24)	(.31)	(.19)
M1	Academic	.22	(.14)	.27	(.18)
	General	(.17)	(.20)	.23	(.21)
	Business	.38	.37	(.29)	(.18)
	Vocational	(.21)	(.16)	(.26)	(.25)
M2	Academic	.27	(.11)	.25	(.11)
	General	(.09)	(.16)	(.12)	(.13)
	Business	.30	(.19)	(.21)	(.23)
	Vocational	(.40)	(.23)	(.30)	.59
M3	Academic	.33	(.10)	.33	(.14)
	General	(.20)	(.12)	.26	(.20)
	Business	.18	(.08)	(.14)	(.10)
	Vocational	(.35)	(.26)	(.26)	(.37)

[a] Not available since staff did not complete VPI in this school.

NOTE:
1. Criterion set was unexcused absences, disciplinary referrals, quality point average, and intelligence score.
2. Unexcused absences were not available for Georgia School 2.
3. Values in parentheses are non-significant at the .05 level; underlined values are significant at the .01 level; others are significant at the .05 level.

larger and reached significance more often than did the distance-based profile scores. This same relationship was observed when the multiple correlations were carried out for grade levels. However, the general superiority of RT over RS values, which existed for the grade level analyses, did not appear when curriculum groups were considered. In fact, RS values exceeded RT values in 9 of 18 comparisons.

The magnitudes of the RS and RT values compare well with these obtained during the grade level analyses. For curriculum analyses the range of RS values was from .07 to .40 and of RT values was from .12 to .43. For the grade level analyses, the ranges were .16 to .45 and .16 to .47, respectively.

In comparing the validity coefficients for the different types of curricula, it is apparent that the larger RS values occur in the Business and Vocational groups. Although the multiple correlations for the Business and Vocational curricula do not reach statistical significance as often as for the academic curriculum, this is undoubtedly due to the smaller numbers of students in these curricula. The consistency of the results across the different schools, suggests that the indicated correlations are not the result of chance factors. On the other hand, for RT values, the larger coefficients occur in the Academic curriculum, with generally smaller values occurring in the other three curricula. This suggests that for students in an Academic curriculum, similarity to the personality of staff is more critical to school success than it is for students in other curricula. However, for students in Business and Vocational curricula, school success depends more on congruence with other students than it does on congruence with staff in terms of personality variables. For students in General curricula, the validity coefficients are relatively small when either RS or RT values are used. These patterns of RS and RT values for the curriculum groups suggest that students selecting different curricula in high school also involve themselves in situations for which different dynamics are relevant in order to gain school success.

C. Classroom Level Analyses

In each school, two classrooms were singled out for additional investigation. The teachers in these classes were volunteers and characteristics of the classes were presented in Section III. Two new sources of data were available for the students in the selected classrooms. First, a behavior rating scale (the Pupil Classroom Behavior Scale, or PCBS) was completed by the teacher for each student in his or her classroom. This instrument yields three factor-based scores which are descriptive of a student's behavior as reported by the teacher. Second, each student rated his or her teacher on a total of 42 items contained on an instrument known as the Maryland Instrument for Student Rating Of Teachers (MISROT). In the paragraphs below, summaries of factor analyses of the PCBS and MISROT are reported and the rationale for the development of a factor-based scoring procedure for the MISROT is given. The data from the PCBS and from the MISROT were used in combination with VPI scores and with criterion variable scores (i.e., unexcused absences, disciplinary referrals, quality point average, as well as intelligence test score) in a series of analyses performed at the classroom level.

1. Analysis of the PCBS

The PCBS was originally developed for use with elementary school students. The factor analysis, upon which factor-based scoring was predicated, was based on ratings of about 3,100 children in grades 2 through 6. Three factors, named achievement orientation, socio-academic creative, and socio-cooperative, were isolated which accounted for 89% of the total common item variability. The items which are keyed on each score are logically related, as well as statistically similar.

Due to the logical reasonableness of the factor-based scores, it seemed appropriate to key the PCBS for the high school students in the same way as previously developed for elementary school students. However, the item data for the high school students involved in this project were also factor analyzed in an attempt to provide some confirmatory evidence that the PCBS measures similar traits on the high school level.

In the 12 classrooms of high school students, there was a total of 343 complete sets of PCBS ratings. A principal axes factor analysis of the inter-item correlation matrix provided a total of 13 non-negative eigenvalues and their associated factors. These 13 factors accounted for 67% of the total common item variability. Table 18 shows the cumulative proportions of total variance for each factor. The cumulative proportions suggest that three, or at most four, distinct factors underly the 24 item PCBS. Since the original factor analysis on elementary school students yielded three distinct factors, a varimax rotation was performed and restricted to just the first three factors drawn from the principal axes solution. All loadings larger than |.20| are displayed in Table 19. Factor I is characterized by items 1, 5, 10, 13, and 14; factor II by items 8, 15, 16, 19, 21, and 24; and factor III by items 3, 4, 7, and 11. A

TABLE 18

SUCCESSIVE CUMULATIVE PROPORTIONS OF VARIANCE FROM FACTOR ANALYSIS OF THE PCBS

Factor	Cumulative Proportion	Factor	Cumulative Proportion
1	.45	8	.66
2	.55	9	.67
3	.59	10	.67
4	.62	11	.67
5	.63	12	.67
6	.65	13	.68
7	.66		

TABLE 19

FACTOR LOADINGS ON THE PCBS (BASED ON 343 HIGH SCHOOL STUDENTS)

	Factor			
Item	I	II	III	Communality
1	-.73	[a]	-.25	.59
2	.33	-.39	.62	.64
3	.38	-.30	.78	.84
4	.42	[a]	.71	.71
5	-.83	[a]	-.23	.75
6	.41	-.40	.26	.39
7	.32	[a]	.81	.79
8	[a]	-.63	.34	.52
9	-.55	.21	-.64	.76
10	-.72	[a]	-.42	.70
11	.28	-.35	.74	.74
12	-.39	.30	-.39	.40
13	-.70	.34	-.41	.77
14	-.73	.23	-.27	.66
15	[a]	-.79	[a]	.67
16	.24	-.62	[a]	.45
17	[a]	.54	-.33	.41
18	-.52	.45	-.36	.60
19	[a]	-.69	[a]	.51
20	.35	-.53	[a]	.40
21	[a]	-.63	.22	.45
22	.49	-.31	.56	.65
23	.34	-.29	.36	.33
24	[a]	-.61	[a]	.43

[a] Less than |.20|

NOTE: Largest absolute value per item is underlined.

comparison of these results with the key for the PCBS in Appendix B reveals little similarity. Also, the results from the 343 high school students do not yield a simple and reasonable set of scores with face validity related to the purpose of the PCBS ratings. This may be due to at least three reasons. First, the number of high school students was relatively small and these students, or their teacher raters, may not be representative of results if a larger population had been used. Second, the pool of items included in the PCBS may, in fact, not be appropriate for high school students. With elementary school students, almost 90% of the item variability was accounted for by the first three factors; for the high school students only 59% was explicable in terms of three factors, and only 68% by 13 factors. This suggests that more consistent sets of items could be developed for rating of high school students. Third, the behavior rating task may be perceived by high school teachers differently than by elementary school teachers. A high school teacher cannot become as well informed about his or her larger number of students as can an elementary school teacher in a self-contained classroom. Again, this suggests that more relevant pools of items may be needed for meaningful behavior ratings of high school students.

From the point of view of this project, the factorial composition of the PCBS as evidenced by the factor analysis based on high school students, did not suggest an interpretable set of scores. As an example of this inconsistency, consider items 5, 13, and 14, each of which leads highly and negatively on factor I. Both items 13 and 14 are stated so that high ratings represent disruptive, teacher-nonapproved behavior; item 5, on the other hand, is positively stated. The fact that all three of these items have high loadings _of the same sign_ on factor I, poses serious interpretive difficulties.

Due to the failure of the factor analysis based on the high school students to yield "clean" factors, and since the factors previously isolated on elementary school students are easily interpretable, the original elementary school key was used in this project.

2. Analysis of the MISROT

The MISROT was an original instrument developed for use in this project. Although the items were developed on the basis of a logical analysis of teacher behavior in the classroom, no _a priori_ item key was produced; rather, the empirical structure of the MISROT was investigated by analysis of the inter-item correlation matrix based on completed MISROT's for 325 students in the 12 high school classrooms. A principal axes factor analysis of these correlations resulted in 24 non-negative eigenvalues; the cumulative proportion of variance accounted for by these 24 factors are displayed in Table 20.

TABLE 20

SUCCESSIVE CUMULATIVE PROPORTIONS OF VARIANCE FROM FACTOR ANALYSIS OF THE MISROT

Factor	Cumulative Proportion	Factor	Cumulative Proportion
1	.50	13	.71
2	.60	14	.71
3	.62	15	.72
4	.64	16	.72
5	.65	17	.72
6	.66	18	.73
7	.67	19	.73
8	.68	20	.73
9	.69	21	.73
10	.69	22	.73
11	.70	23	.73
12	.71	24	.73

The first three factors account for 62% of the common item variance and little is gained by considering additional factors. Hence, varimax rotation was restricted to the first three factors and the item loadings which resulted are presented in Table 21. Inspection of the pattern of loadings reveals that each factor is typified by a number of heavily loaded, or defining, items. Factor I is characterized by items 2, 4, 6, 10, 22, 24, 26, 32, 34, 36, and 42, each of

TABLE 21

FACTOR LOADINGS ON THE MISROT (BASED ON 325 HIGH SCHOOL STUDENTS)

Item	Factor I	Factor II	Factor III	Communality
1	.51	-.24	.40	.52
2	.83	-.21	.32	.85
3	.51	a	.48	.55
4	.81	-.22	.34	.82
5	.55	-.28	.50	.63
6	.77	-.24	.33	.77
7	.39	a	.58	.53
8	.64	-.30	.31	.60
9	a	-.62	a	.47
10	.76	-.21	.40	.78
11	a	-.67	a	.59
12	.50	-.67	a	.75
13	a	-.74	a	.61
14	.70	a	.48	.78
15	.45	a	.52	.54
16	.46	-.66	a	.67
17	.46	-.25	.55	.58
18	.62	-.50	a	.65
19	.30	a	.46	.36
20	.68	-.23	.28	.60
21	.44	a	.58	.56
22	.86	-.20	.29	.87
23	.39	a	.62	.55
24	.75	-.20	.40	.76
25	a	-.70	a	.54
26	.85	a	.31	.86
27	.35	a	.66	.57
28	.48	-.62	a	.66
29	.46	-.24	.47	.51
30	.66	-.29	.34	.66
31	a	-.79	a	.69
32	.71	-.27	.34	.73
33	a	-.70	a	.56
34	.73	-.22	.37	.72
35	.39	-.22	.37	.43
36	.79	a	.33	.79
37	a	-.79	a	.66
38	.58	-.55	a	.67
39	.20	-.50	.27	.37
40	.48	-.69	a	.71
41	a	-.78	a	.63
42	.70	-.20	.35	.66

[a] Less than |.20|

NOTE: Largest absolute value per item is underlined.

which has a loading of at least |.70|. Similarly, factor II is represented by items 12, 25, 31, 33, 37, and 41, each having a loading of at least |.70|. Finally, factor III is represented by items 7, 17, 21, 23, and 27, each having a loading of at least |.55|. These items suggest the following descriptive names for the factors:

Factor I	Ideal teacher-image conformity
Factor II	Fairness of behavior
Factor III	Motivational dynamicism.

Inspection of the remaining items suggested the key presented in Appendix F.

3. Comparison of PCBS and MISROT

Scores on the PCBS represent a teacher's ratings of a student and scores on the MISROT represent a student's ratings of a teacher. While not central to the purposes of this project, it is of interest to raise a question concerning the agreement, or disagreement, exhibited by student-teacher pairs of ratings. That is, some light may be thrown on the nature of these two measuring instruments by investigating the degree to which teachers and students agree in their ratings of one another. It seems reasonable that students who are perceived by their teacher as not being behavior problems in the classroom will also be favorable toward that teacher. Thus, the student more likely to receive the reward of teacher approval is also the student more likely to reward his teacher with his own approval. Since the PCBS and MISROT each yield three scores, the two sets of scores for each classroom were correlated. The resulting canonical correlation coefficients (for the first canonical function), and the numbers of students for whom complete sets of scores on both tests were available, are displayed in Table 22.

TABLE 22

CANONICAL CORRELATIONS OF THE PCBS AND THE MISROT

School	Class-room	Number	Canonical R	School	Class-room	Number	Canonical R
G1	1	30	.69	M1	1	27	.37
G1	2	26	.72	M1	2	25	.80
G2	1	28	.43	M2	1	32	.42
G2	2	21	.57	M2	2	30	.74
G3	1	12	.83	M3	1	32	.49
G3	2	17	.61	M3	2	31	.34

NOTE: The total number of usable PCBS's was 343; for MISROT this number was 325; due to some non-matches, only 311 complete sets of scores on the two variables of variables were available.

The range of canonical correlation coefficients is from .34 to .83, with the median value at .59 (i.e., between .57 and .61). The relatively large relationship which generally existed between PCBS and MISROT scores has an immediate implication in terms of this project. These canonical correlations suggest that the keying procedures result in meaningful scores on the two instruments. That is, finding the predicted relationship between PCBS and MISROT scores implies that the keying procedures have validity for measuring relevant aspects of classroom behavior. Of course, the evidence is indirect but it nevertheless serves to substantiate subsequent use of these instruments in this project.

4. Prediction of Classroom Achievement

In addition to the information from the VPI, PCBS, and MISROT, the three schools in Georgia provided data on achievement, disciplinary referrals, and unexcused absences with reference, specifically, to the classroom of which the student was a member. That is, his number of unexcused absences from that particular classroom, etc. Inspection of the distributions for disciplinary referrals and unexcused absences revealed that these data would not serve as useful criterion variables due to the small number of non-zero scores. In three of the six classrooms, no student had either an unexcused absence or a disciplinary referral. In the remaining three classrooms, not more than two students were reported as having non-zero entries for these two variables. Thus, attention in these classrooms was focused on classroom achievement, represented by the first semester average grade converted to a quality point average over the interval 0 through 4. The classroom level achievement, referral, and absence data were not obtained from the three Maryland schools. For these classrooms, total quality point average was used as the criterion variable.

The purpose of the following set of analyses was to determine the degree to which achievment could be predicted by various combinations of the rating instruments and VPI scores. A series of step-wise regression analyses was performed. Four different sets of predictor variables were investigated. Set 1 was composed of all subscores from the PCBS, MISROT, VPI, and included intelligence scores, resulting in a total of 13 predictors. Set 2 was the same as set 1, except intelligence scores were deleted; hence, it contained 12 predictors. Set 3 was comprised of the six VPI scores only. Finally, set 4 contained the three PCBS scores and intelligence scores. The results of the multiple correlational analyses are summarized in Table 23. Due to the small numbers of complete sets of data in Georgia School 3 classrooms, sets 1 and 2 of predictors could not be used; that is, for example, with 11 cases and either 12 or 13 predictors, there are insufficient degrees of freedom to carry out the fitting of a regression surface. In general, the multiple correlations were very substantial. Using the total set of predictors, set 1, the coefficients were all .84 or

TABLE 23

RESULTS OF PREDICTING CLASSROOM ACHIEVEMENT GEORGIA SCHOOLS

School & Classroom		Number[a]	R1	R2	R3	R4	R5[d]
G1	1	26	.84	.84[c]	.55	.77[c]	.76
G1	2	24	.96[b]	.90[c]	.50	.69[c]	.68
G2	1	18	.92	.90	.71	.71[c]	.69
G2	2	18	.92	.91	.77	.63	.63
G3	1	11	[e]	[e]	.75	.53	.49
G3	2	13	[e]	[e]	.60	.84[c]	.78

[a] These numbers disagree with those in Table 22 since some non-matches occurred when the VPI data were combined with the PCBS and MISROT data.

[b] Significant at the .01 level.

[c] Significant at the .05 level.

[d] Levels of significance not determined for these values; R5 values obtained by subtracting from $(R4)^2$ the proportion of variance attributable to intelligence scores.

[e] Insufficient degrees of freedom to allow use of predictor sets 1 and 2.

NOTE: R1 predictor set included PCBS, MISROT, VPI, and intelligence score.
R2 predictor set included PCBS, MISROT, and VPI.
R3 predictor set included VPI only.
R4 predictor set included PCBS and intelligence score.
R5 PCBS scores only as predictors; found by eliminating the variance due to intelligence scores from the R4 values.

above. When intelligence scores were dropped from the predictor set, the range of multiple correlations was still .84 to .91. In each case, intelligence scores added relatively little to the total predictive power of the set of rating scales and VPI scores. These very large coefficients should be, however, interpreted somewhat cautiously since the number of predictors was large compared with the number of students. Due to the small numbers of degrees of freedom remaining to test the significance of these multiple correlation coefficients, only the two values for classroom 2 and one of the values for classroom 1 in Georgia School 1, reached statistical significance at the .05 level.

Using only the six VPI scores as predictors, the multiple correlations range from .50 to .77, but none reaches statistical significance at the .05 level. Again, the small numbers of degrees of freedom for residuals about the regression surface required extremely large values in order to reach statistical significance. Nevertheless, the consistent pattern of results from six separate classrooms suggests that the VPI scores are, in fact, valid predictors of classroom achievement. In order to study the contributions of the separate VPI scores to the prediction of quality point average in the classroom, Table 24 presents the proportions of variance in quality point average accounted for by each VPI

TABLE 24

STEP-WISE VARIANCE PROPORTIONS ATTRIBUTABLE TO VPI SCORES
GEORGIA SCHOOLS

School & Classroom		Realistic	Intellectual	Social	Conventional	Enterprising	Artistic	R^2
G1	1	(-) .04	(+) .02	(+) .10	(+) .01	(-) .02	(-) .11	.31
G1	2	(-) .03	(+) .01	(+) .09	(+) .00	(-) .01	(-) .10	.25
G2	1	(-) .17	(+) .04	(+) .06	(-) .11	(-) .02	(-) .09	.51
G2	2	(-) .41	(+) .06	(+) .02	(+) .01	(+) .02	(-) .07	.58
G3	1	(-) .06	(+) .28	(-) .01	(+) .06	(+) .08	(-) .07	.56
G3	2	(-) .18	(+) .03	(+) .06	(-) .01	(+) .01	(-) .07	.36

NOTE: Sign of regression coefficient shown in parentheses; due to rounding errors, entries in the R^2 column do not agree perfectly with row sums.

score and, in parentheses, the sign of the partial regression coefficient for each score.

The largest contributors are the Artistic and Realistic scores. If the proportions are ranked by rows, then averaged over the six classrooms, the order of contributors and their average rank are: Artistic (2.0), Realistic (2.2), Social (3.6), Intellectual (3.7), Enterprising (4.5), and Conventional (5.0). The sign of the regression coefficient associated with both the Realistic and Artistic scales is negative; for the next two leading contributors, Social Intellectual scores, the sign is consistently (with one exception) positive. Thus, in terms of VPI profile, high scores on the Intellectual and Social scales and low scores on the Realistic and Artistic scales would be associated with high classroom achievement in terms of quality point average. The negative weighting of the Artistic scale is interesting since persons high on this scale can be expected to achieve relatively less well than others, yet the scale description implies that many creative individuals would be typed here.

Turning to the PCBS scores as predictors of classroom achievement, it is apparent that these teacher ratings, when coupled with intelligence test data provide, on the average, better prediction than the VPI (see R4 column in Table 23).

However, when the contribution of intelligence scores is removed, the PCBS scores by themselves have, on the average, no more predictive power than the VPI (see R5 column in Table 23). This finding is especially interesting since the PCBS ratings are performed by teachers and these same teachers gave the grades which resulted in a student's quality point average. Thus, the VPI profile was, on the average, as much related to the student's classroom achievement as was the teacher's rating of the student's classroom behavior. Of course, the quality point average reflects many other factors not included in the PCBS scores, but, nevertheless, among the non-intellective factors investigated at the classroom level, the VPI provides useful insights into the dynamics of a student's success in school. Once again, the chicken-and-egg problem must go unresolved. That is, a student who is rewarded by receiving high achievement scores may be rewarded because he is a specific type of student (i.e., high Social and Intellectual type, low Realistic and Artistic type) or he may become a certain VPI type because he is rewarded in the classroom. To gain insight into the actual causal mechanisms requires experimental manipulation of reinforcing contingencies and none was planned in this study.

Table 25 shows the proportions of quality point average

TABLE 25

STEP-WISE VARIANCE PROPORTIONS ATTRIBUTABLE TO PCBS SCORES--GEORGIA SCHOOLS

School	Class-room	Achievement Orientation	Socio-Academic Creative	Socio-Cooperative	R^2
G1	1	(+) .53	(+) .02	(-) .03	.58
G1	2	(-) .00	(-) .02	(+) .43	.46
G2	1	(+) .39	(-) .02	(-) .07	.48
G2	2	(+) .38	(+) .01	(-) .01	.40
G3	1	(-) .02	(+) .22	(+) .00	.24
G3	2	(-) .00	(+) .60	(+) .00	.61

NOTE: Sign of regression coefficient shown in parentheses; due to rounding errors, entries in the R^2 column do not agree perfectly with row sums; variance due to intelligence scores has been subtracted from R^2.

variance attributable to each PCBS score. The pattern is not well defined. If the rows are ranked and averaged over the six classrooms, the order is: Achievement Orientation, Socio-Academic Creative, and Socio-Cooperative. However, the average ranks are 1.8, 2.0, and 2.2, showing little consistency in the order.

A similar set of multiple correlation analyses was performed using the classrooms in the Maryland schools and utilizing total quality point average as the criterion variable. Due to an unfortunate clustering of non-matching of VPI data with PCBS and MISROT data, it was decided to eliminate both classrooms in Maryland School 3 from this set of analyses. The percentage of complete sets of data in each of these cases seemed too low to justify any conclusions representative of the entire classroom. For the remaining four classrooms, the multiple correlational results are shown in Table 26:

TABLE 26

RESULTS OF PREDICTING ACHIEVEMENT--MARYLAND SCHOOLS

School	Class-room	Number[a]	R1	R2	R3	R4	R5[b]
M1	1	25	.85	.85	.58	.65[c]	.54
M1	2	23	.69	.69	.44	.58	.57
M2	1	24	.90[c]	.90[c]	.34	.74[d]	.74
M2	2	26	.97[d]	.96[d]	.51	.88[d]	.85

[a] These numbers disagree with those in Table 22 since some non-matches occurred when the VPI data were combined with the PCBS and MISROT data.

[b] Levels of significance not determined for these values; R5 obtained by subtracting from $(R4)^2$ the proportion of variance attributable to intelligence scores.

[c] Significant at the .05 level.

[d] Significant at the .01 level.

NOTE: R1-R5 defined as in Table 23.

Predictor sets 1-4 are the same as those defined for the Georgia schools, only the criterion is quality point average over all courses, not just in the specific classroom. Again, the multiple correlations are generally quite large, reaching .97 for classroom 2 in Maryland School 2 when all 13 predictors are used. Comparing the R2 and R1 values reveals that intelligence scores contribute very little to the predictive power of the predictor set when all predictors are included. Predictor set 3, the six VPI scores, does not reveal as large coefficients against general achievement as it did when only classroom achievement was used. On the other hand, the results when the PCBS scores were the predictors give similar results to those obtained in Georgia schools. In this case, the PCBS score set with intelligence scores removed (i.e., column R5 in Table 26) is, however, a substantially between predictor of general quality point average than is the set of VPI scores.

The proportions of variance in quality point average accounted for by each of the VPI scores are presented in Table 27 and by the PCBS scores in Table 28. The average ranks of the proportions for the six VPI scores are: Intellectual (1.9), Social (3.1), Artistic (3.4), Conventional (3.9), Enterprising (4.1), and Realistic (4.6). The best positive predictor was the Social score, while Intellectual and Artistic scores were the best negative contributors. These results differ considerably from those obtained in the Georgia schools using classroom quality

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TABLE 27

STEP-WISE VARIANCE PROPORTIONS ATTRIBUTABLE TO VPI SCORES
MARYLAND SCHOOLS

School & Classroom		Realistic	Intellectual	Social	Conventional	Enterprising	Artistic	R^2
M1	1	(+) .00	(-) .12	(+) .04	(+) .09	(-) .03	(+) .06	.34
M1	2	(+) .09	(-) .01	(+) .05	(-) .01	(+) .00	(-) .03	.20
M2	1	(+) .00	(-) .08	(+) .01	(-) .01	(+) .01	(-) .01	.12
M2	2	(-) .01	(+) .13	(+) .01	(+) .01	(-) .06	(-) .02	.26

NOTE: Sign of regression coefficient shown in parentheses; due to rounding errors, entries in the R^2 column do not agree perfectly with row sums.

TABLE 28

STEP-WISE VARIANCE PROPORTIONS ATTRIBUTABLE TO PCBS SCORES
MARYLAND SCHOOLS

School & Classroom		Achievement Orientation	Socio-Academic Creative	Socio-Cooperative	R^2
M1	1	(+) .01	(+) .00	(+) .28	.30
M1	2	(+) .28	(-) .00	(+) .04	.32
M2	1	(+) .49	(+) .05	(-) .01	.55
M2	2	(+) .71	(+) .02	(-) .00	.74

NOTE: Sign of regression coefficient shown in parentheses; due to rounding errors, entries in the R^2 column do not agree perfectly with row sums; variance due to intelligence score has been subtracted from R^2.

point average. In Georgia, Intellectual and Social scales each were positive contributors, while Artistic and Realistic scales each were the best negative contributors.

For the PCBS, the first score, Achievement Orientation, was the major contributor for three of the four classrooms, but is not important in the one remaining classroom.

The different results discovered in the classrooms groups when classroom or general quality point average was used as a criterion can be accounted for largely in terms of relevance. That is, the failure to find really consistent patterns among the scores in the VPI and PCBS predictor sets can be attributed to selecting only four classrooms of students to predict general quality point average. The PCBS scores reflect only the perceived classroom behavior of the student in one specific classroom. Undoubtedly, many differences would result if a general measure of behavior in all classes was obtained. Similarly, the VPI score from four classrooms are not a representative sample of the range of types in the entire school. The more relevant criterion at the classroom level is, of course, the classroom quality point average and the results with this criterion displayed a high degree of consistency.

5. Relationships among VPI, MISROT, and PCBS

The last set of analyses to be reported in this study involved the intercorrelation of VPI and MISROT scores and of VPI and PCBS scores by means of canonical correlation. The major purpose of these analyses was to aid in the interpretation of the different kinds of variables involved. Tables 29 and 30 display the results from these two analyses. Again, Maryland School 3 was not included in the analyses due to the small proportion of complete sets of data in the two classrooms.

In general, the VPI and PCBS scores show a high degree of relationship. The range of canonical correlations is from .63 to .91 and the median value falls in the interval from .70 to .75. Thus, on the average, approximately 50% of the variance in one set of scores can be "explained" in terms of the other set of scores. That is, there is a linear combination of the six VPI scores which, when used to predict a linear combination of the three PCBS scores, can reduce the unexplained variance in the PCBS score combination by 50%. Apparently, the student reveals, in his VPI responses, considerable information about himself which is similar to the information about the student utilized by the teacher when making the PCBS ratings. The percentage of "explained" variance in PCBS scores varies from about 40% in

TABLE 29

CANONICAL CORRELATIONS OF VPI AND PCBS

			Largest Loadings[a]			
School & Classroom		Canonical R	VPI		PCBS	
G1	1	.64	+Ent,	-Soc	+SC,	-SAC
G1	2	.75	+Ent,	-Int	+AO,	-SC
G2	1	.77	+Con,	-Int	[b]	-AO
G2	2	.88	+Real,	-Soc	[b]	-AO
G3	1	.91	+Int,	-Real	+SCA,	-SC
G3	2	.70	+Con,	-Soc	+SC,	-AO
M1	1	.70	+Art,	-Con	+SAC,	-SC
M1	2	.77	_Soc,	-Con	+AO,	-SAC
M2	1	.70	+Art,	-Soc	+SAC,	-AO
M2	2	.63	+Art,	-Int	+AO,	-SC

KEY: VPI Scales
Real = Realistic
Int = Intellectual
Soc = Social
Con = Conventional
Ent = Enterprising
Art = Artistic

PCBS Scales
AO = Achievement Orientation
SAC = Socio-Academic Creative
SC = Socio-Cooperative

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[a] The first listing in each set is the variable with the largest positive loading on the first canonical function; the second listing is the variable with the largest negative loading. These are not always the two best discriminators, however, since both of the two best predictors could have the same sign.

[b] All loadings were negative.

TABLE 30

CANONICAL CORRELATIONS OF VPI AND MISROT

School & Classroom		Canonical R	Largest Loadings[a]			
			VPI		MISROT	
G1	1	.71	+Real,	-Soc	+FB,	-MD
G1	2	.63	+Art,	-Con	+MD,	-ITC
G2	1	.75	+Int,	-Soc	+ITC,	-MD
G2	2	.74	+Ent,	-Con	+ITC,	-FB
G3	1	.99	+Soc,	-Con	+MD,	-ITC
G3	2	.92	+Art,	-Ent	+MD,	-ITC
M1	1	.68	+Con,	-Soc	+ITC,	-FB
M1	2	.75	+Art,	-Ent	+FB,	-MD
M2	1	.66	+Art,	-Soc	+MD,	-ITC
M2	2	.60	+Art,	-Soc	+MD,	-ITC

KEY: VPI Scales
Real = Realistic
Int = Intellectual
Soc = Social
Con = Conventional
Ent = Enterprising
Art = Artistic

MISROT Scales
ITC = Ideal Teacher-Image Conformity
FB = Fairness of Behavior
MD = Motivational Dynamicism

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[a] The first listing in each set is the variable with the largest positive loading on the first canonical function; the second listing is the variable with the largest negative loading. These are not always the two best discriminators, however, since both of the two best predictors could have the same sign.

classroom 2 of Maryland School 2 to about 83% in classroom 1 of Georgia School 3. Examination of the coefficients of the scores from each instrument on the first canonical function reveals no consistency across the ten classrooms. Thus, no particular linear combination of the scores on the VPI and PCBS can be isolated which accounts for the high degree of relationship between these two instruments. From a theoretical point of view, this finding is unfortunate since no insight is gained into the details of the construct similarity between the VPI and PCBS. At a gross level, it can be said that the VPI and PCBS measure similar, or overlapping, traits of high school students, but the dynamics underlying a teacher's rating of a student's classroom behavior undoubtedly vary considerably among teachers.

The VPI and MISROT scores also showed high degrees of relationship (Table 30). The range of canonical correlations was from .60 to .99, with the median value at approximately .72. Examination of the loadings of the scales on the first canonical function reveals a definite pattern for at least several of the classrooms. Among the VPI scale, Artistic is the largest positive contributor in five of the ten classrooms, and Social is the largest negative contributor in five cases. However, no particular combination of positive and negative loading scales from the VPI was evident.

On the MISROT, the Motivational Dynamicism score is the leading positive contributor and Ideal Teacher-Image Conformity the major negative contributor. In this case, Motivational Dynamicism and Ideal Teacher-Image Conformity are paired as largest positive and negative contributor, respectively, in five of the classrooms. Also, in four of these five classrooms, the largest positive contributor from the VPI was the Artistic scale. Thus, in four of the ten classrooms, a definite pattern exists, with high Artistic VPI scores associated with high Motivational Dynamicism and low Ideal Teacher-Image Conformity scores from the MISROT. This pattern suggests that much of the relationship between these two instruments can be accounted for in terms of high Artistic scale students rating their teachers high on Motivational Dynamicism and low on Ideal Teacher-Image Conformity, and vice versa. The pattern is a logical one in terms of the names of the scales involved. It is interesting to note that the four classrooms in which this pattern exists represent a variety of curriculum majors (i.e., academic, business, etc.) and of subject matter (i.e., Geometry, Social Studies, etc.).

SECTION V

CONCLUSIONS AND IMPLICATIONS

A. Conclusions Concerning Research Hypotheses

In Section II of this report, three general hypotheses were stated. Each of these referred to one of the organizational levels investigated in this study--grade, curriculum, and classroom. In the paragraphs below, the results are interpreted in terms of each of these hypotheses.

1. Grade Level Analyses

The first hypothesis concerned the congruence between an individual student's VPI profile and the profile of VPI scores for all students at the same grade level. It was predicted that the greater the congruence, the more success the student would experience in terms of high quality point average, few unexcused absences, and few disciplinary referrals. Investigation of this first hypothesis began by attempting to derive single profile scores from the six VPI scores and then using these profile scores to study the regression on the academic variables. Using multiple regression techniques, it was found that correlational-type profile scores were generally moderately related to the criterion set and that student intelligence, except in one school accounted for virtually none of the relationship. Also, profile scores based on comparison with staff VPI profile, were generally more related to the academic criterion set than were profile scores based on comparison with grade level student VPI profiles. Thus, the analysis of the profile scores tended to support the first hypothesis, but the magnitudes of the multiple correlations were in a range to account for only 10 to 15% of the variance in the criterion set. Hence, further analyses were carried out using the six VPI scores per student rather than the single profile score. The first analysis with the six VPI scores involved fitting canonical functions to the VPI score set and the criterion set. The canonical correlation coefficients for the first canonical function were in a range to account for between 15 and 25% of the variance in the criterion set. This was a distinct improvement over the results using the profile scores and added substantially to the evidence that VPI scores are valid predictors of success in school.

Bearing more directly on the first hypothesis, was a series of discriminant analyses using the six VPI score, both with and without intelligence scores, to predict classification of students in extreme criterion groups. For top and bottom 25% groups based on the quality point average variable, between 62 and 77% correct classifications were possible using VPI scores only; adding intelligence data increased these percentages to between 77 and 90%. For unexcused absences and disciplinary referrals, the criterion groups were not really extreme due to the skewness of the distributions of these variables. With intelligence scores in the predictor set with VPI scores, between 58 and 80% correct classifications were possible for unexcused absences and between 59 and 78% correct classifications for the disciplinary referrals groups. The concentrations of 0 scores for each of these criterion variables presented a difficult discrimination situation. With respect to the first hypothesis, these results are somewhat mixed. For the criterion of quality point average, the classificatory efficiency of the VPI scores lends support to the hypothesis; on the other hand, for unexcused absences and disciplinary referrals the prediction situation was unfavorable due to the nature of the "extreme" groups and the results do not give new support for the hypothesis, although they do not contradict it. In a further attempt to study the validity of VPI scores for the criterion of quality point average, the six VPI scores and intelligence scores were used as multiple predictors, with quality point average as the dependent variable. In this analysis, the entire population of students and the entire range of achievement were included. The results showed that the VPI scores can account for between 2 and 19% of the variance in achievement not accountable for by intelligence scores alone. In general, when intelligence was not a good predictor of achievement, the predictive contribution of the VPI was greater; and, also, the VPI made a greater contribution to the prediction of quality point average for 11th and 12th graders since at these grade levels the correlation between intelligence and quality point average tended to be lower.

In summary, the evidence lends credence to the hypothesis that VPI personality type is a valid predictor of academic success in high school. From purely a prediction point of view, the VPI scores are valuable non-intellective contributors to include in a multiple prediction set. From a more general point of view, these results suggest that the VPI type of a student is at least partially responsible for his success in school. The classroom level results, discussed later in this section, throw some light on the specific patterns of VPI scores that enhance school success and imply something about the dynamics underlying this phenomenon.

2. Curriculum Level Analyses

The general hypothesis for analyses performed at the curriculum level stated that the VPI profile congruence of a student with others in the same curriculum as he, was predictive of his academic success. Profile scores were derived using comparison profiles based on curriculum groups. The only analysis performed at the curriculum level involved investigation of the multiple correlation between the criterion variables and these profile scores. In general, similar ranges of multiple correlations were observed with the curriculum groups as with the grade level groups. However, the superiority of staff, based profile scores over student based profile scores did not recur here. The moderate relationship between VPI profile and the criterion variables can be taken as suggestive, but not conclusive, evidence in favor of the second hypothesis.

3. Classroom Level Analyses

For the two special classrooms selected for additional study in each school, the general hypothesis from Section II stated that the student's academic performance and his rating of his teacher are related to his VPI scores and to teacher ratings of his classroom behavior. The instrument developed to obtain student ratings of teachers, the MISROT, was factor analyzed and keyed to yield three factor-based scores. The instrument used to obtain teacher ratings of students, the PCBS, was also factored, but did not yield meaningful clusters of items. Hence, a key previously developed for use with elementary school students was used in this study.

Canonical correlations between MISROT and PCBS scores revealed something of a "mutual admiration society" operating within these classrooms. The coefficients were generally moderate to large, with a median value at .59. Thus, a teacher who gave favorable ratings to a student was also likely to be favorably rated by that student.

In the three Georgia schools, classroom achievement data were available and the predictive efficiency of the VPI and PCBS for this criterion was investigated. The multiple correlations were generally high, ranging from .50 to .77 for the VPI and from .49 to .78 for the PCBS. On the average, the VPI scores were as good predictors as the PCBS. Thus, the VPI type of a student is as efficient a predictor of classroom achievement as the teacher's rating of the student's classroom behavior. Also, for VPI scores, high Social and Intellectual scale scores with low Realistic and Artistic scale scores represents a pattern associated with success in classroom achievement.

In the Maryland schools, the criterion of total quality point average was predicted from VPI and PCBS scores. In this case, the PCBS scores were a more efficient predictor than the VPI scores. Among the VPI scales, the best predictors still involved the Social scale as a positive contributor and the Artistic scale as a negative contributor, but the general pattern found in the Georgia schools did not recur. One can, however, question the relevance of general quality point average as a criterion when utilizing the classroom data as predictors.

The results from the attempts to predict achievement from classroom rating data and VPI scores gave clear support for the general hypothesis stated at the classroom level. The relationship of PCBS scores to classroom achievement was anticipated since the teacher who makes the PCBS ratings also assigns the grades to the students. However, the equally good predictive power of the VPI scores supports the notion that the VPI personality typing of students is basic to explaining the performance of students in school.

Also, at the classroom level, the relationships of the VPI and PCBS, and VPI and MISROT were investigated in order to afford additional interpretation of these instruments. For both cases, canonical coefficients were moderate to large and indicated considerable overlap among these instruments. For the VPI and PCBS, no distinct pattern was discernible on the first canonical function. However, for the VPI and MISROT, high Artistic scores were associated with high Motivational Dynamicism ratings and low Ideal Teacher-Image Conformity ratings.

B. Theoretical Implications

1. Construct Validity of the VPI

The present study has a variety of implications concerning the meaning of the VPI as a measuring instrument. From Holland's descriptions of the six VPI scales, it would be expected that high academic achievers would be associated with high Intellectual scale scores since this scale is associated with the professional and scientific occupations. Also, the Realistic scale description implies that this type would not be associated with high academic success. The logical association of the remaining four types with academic success is unclear from Holland's descriptions. From the classroom level analyses, it was confirmed that the Intellectual and Realistic scales are related, as logically deduced, to classroom achievement. Also, however, the consistent negative contribution of Artistic scores and positive contribution of Social scores to classroom achievement supplements the logical analyses and adds to the meaning of these scales.

As reported in Section I, Holland and others have found the VPI scales to be related to choices of major fields for college students and to a number of other traits and rating responses given by those students. The finding of a general relationship of the VPI to school achievement and other forms of school success in this study extends the earlier findings by linking the VPI scales to intellective, as well as non-intellective, aspects of behavior at the high school level.

Canonical correlation of the VPI with the PCBS, while not providing consistent patterns of loadings on the canonical functions, did, nevertheless, reveal a generally high relationship and suggests that the VPI typing of a student is instrumental in the ratings given to a student by a classroom teacher. The failure to find consistent patterns among the loadings can be attributed to the unique way in which a given teacher responds in terms of this personality information. Also, the results of the canonical correlations involving the VPI and the MISROT suggest that the Artistic scale from the VPI influences the way in which a student perceives his classroom teacher.

2. The Reward Expectancy Model

The reward expectancy framework, developed in Section I of this report, received considerable support from findings in this study. In a general sense, it can be inferred that a student's choices of occupational titles represent expectancies relative to his own desired forms of reward from the world of work. Hence, if the scores from the VPI can be shown to be predictive of success in school, this, in a general way, confirms the notion that school success depends upon the operation of reward expectancies existing in students. Since the VPI did turn out to be a reasonably valid predictor of quality point average, this increases our faith in the reward expectancy model. The dynamics of the awarding of reinforcement within the school environment are left largely undescribed in this study. Some insight can be gained, however, into this process from the results from the classroom level analyses. The finding that the Social scale of the VPI was a leading positive contributor to the correlation of the VPI with classroom quality point average is of special interest since teachers are typified by Holland as representing this scale. Holland's contention is supported by data from this study. Examining the mean VPI scores for staff (which is comprised predominantly of teachers) presented in Table 4, reveals that in five of the six schools, staff had its highest mean on the Social scale; in the remaining case, the Social scale had the second highest mean. Apparently, a student increases his chances of academic success in the classroom by resembling the predominant teacher VPI type.

Also reflecting on the reward expectancy model were the results from the canonical correlations between VPI and PCBS scores performed at the classroom level. Although no consistent pattern among the scales in either set of scores was evident, the degree of relationship exhibited implies an interdependence between the type of student and the teacher rating of that student's behavior. Since the impression of a student gained by the teacher is certainly related to the success of that student in school (as evidenced by the multiple correlations between quality point average and the PCBS scores), it appears once again that the student's reward expectancies, as tapped by the VPI, are conditioning his success in the classroom.

The type of confirmation received by the reward expectancy model in this study is certainly not sufficient to urge its adoption as a highly tenable working model for explaining student behavior in school. Rather, this study represents a first attempt at validating this model and, as such, has proved sufficiently positive toward the model to encourage additional research aimed at more rigorous testing of deductions from the model. Some more specific suggestions along this line are presented later in this section.

C. Practical Implications

While this study was not aimed at the immediate solution of any applied educational problem, the results do, nevertheless, have certain implications of a practical nature. The additional construct validity established for some of the VPI scales should be useful to counselors who use this instrument as a tool of their trade. A counselor who is alert to the possible significance of the reward expectancy model and who is familiar with the empirically derived meanings of the VPI scales would certainly be in a better position to utilize fully the information from the VPI in a counseling situation.

While it does not seem appropriate to routinely communicate results from instruments such as the VPI to classroom teachers, information from the VPI scales could if properly interpreted, serve as valuable information in situations in which intensive study is being made of school problems associated with a specific student. The student who exhibits "deviant" behavior in school and becomes a "behavior problem" may be a victim of a conflict between reward contingencies and reward expectancies. The VPI profile may have some value in elucidating such a situation, although more research aimed specifically at this application of the VPI is needed before this suggestion can be accepted completely.

D. Implications for Further Research

1. Validation at Other Educational Levels

A natural direction in which the work of the present study could meaningfully be extended is toward lower school grade levels. Before the reward expectancy model can be tested at all educational levels, it will be necessary to devise some method for evaluating a student's reward expectancies regardless of his age or grade placement in school. It seems unlikely that the present form of the VPI could be used with school children below junior high school level. Many of the occupational titles will have little, if any, associational value even at the junior high level. However, it appears completely feasible to keep the orientation toward occupational information and revise the instrument for administration down to, say, the second grade level. It is, of course, an empirical question whether this approach is one which will meet with success.

2. Development of Other Relevant Instruments

Certainly occupations choice is not the only logical approach to assessing the reward expectancies of students. A useful line of additional research could be focused on the isolating and measuring of other relevant aspects of human choice behavior. If suitable measuring instruments, incorporating non-occupational choice situations, can be developed, the reward expectancy model can be tested with more generality than the present methodology has allowed. However, a serious consideration in any such undertaking centers about the problems of instrument transparency and neutrality of content. By "instrument transparency" is meant the overtness of purpose in many current personality instruments. When an instrument is overt, problems of faking quickly become serious. With occupational titles as stimuli, the test presents a natural and apparently obvious situation to the student. The fact that the responses will be used to personality type the student is certainly not apparent from the instrument itself. By "neutrality of content" is meant the non-controversial nature of occupational inventories. Neither student, school personnel, nor parents are threatened by the term "vocational test." On the other hand, an overt personality test may be the center of debate, whether justly or not. The VPI in its present form is neutral in content and is not transparent. If other instruments are to be designed to tap similar aspects of personality, these qualities are extremely desirable.

3. Design of Experimental Studies

Probably the most urgent next step involves the design of studies in which the reward contingencies in a school, or school-like, situation are experimentally manipulated in order to study their effects on both measuring instruments such as the VPI and on criterion variables. Along this line, studies can be designed to explore the dynamics of teacher doling of reward in a classroom situation. In this type of study, the teacher would be the experimental subject, and information could be sought concerning the way in which a teacher constructs the reinforcement contingencies with which students must cope in order to be successful in the classroom. On the other hand, students in intact, or artificially created, classrooms could be studied to more thoroughly analyze the relationship between personality type and ability to react in terms of prevailing reinforcing structures.

4. Longitudinal Studies

An interesting area for additional research centers around the problems, mentioned in this report, of isolating cause and effect when dealing with personality type as a predictor of academic success. It appears that studies designed to measure personality structure at a number of intervals throughout the school years could help resolve this issue. The major difficulty in such an approach would be the assurance that a set of measures taken at, say, the third grade level are comparable to a set of measures taken at, say, the 12th grade level. This problem has arisen in longitudinal studies of the growth of intelligence and would be a major concern in evaluating the reward expectancy model for the full range of grade levels.

SECTION VI

SUMMARY

A. Background

A number of authorities has cited the disorganizing and non-integrative effects upon educational research of the failure to plan studies within a framework of theory. In this project, a "reward expectancy model" was derived from constructs in reinforcement psychology, organization theory, and measurement theory, and a modified form of the Holland Vocational Preference Inventory (VPI) was developed in order to allow an initial validation of this model. The VPI, which yields scores on six personality typings, was selected because it is an instrument originally developed by Holland from a theory of occupational choice and because it presents an efficient and non-threatening device for collection of personality information. The logical relationships between Holland's occupational choice constructs and the reward expectancy model were outlined and the relevant research background utilizing the VPI was reviewed.

B. Objectives

1. First Hypothesis

The greater the congruence between a student VPI profile and the overall grade level profile, the better is the student's academic achievement (measured by quality point average with the regression of intelligence scores removed) and behavior as measured by unexcused absences and disciplinary referrals.

2. Second Hypothesis

The greater the congruence between a student VPI profile and the profile of the curriculum (college preparatory, general, etc.) in which he is enrolled, the better is the student's academic achievement (as measured by quality point average with the regression of intelligence scores removed) and behavior as measured by unexcused absences and disciplinary referrals.

3. Third Hypothesis

The performance of a student in a classroom (as measured by quality point average with the regression of intelligence scores removed) is related to the student's VPI profile and to teacher ratings of student classroom behavior. Also, the student's ratings of his classroom teacher are related to his performance in the classroom and to the teacher's ratings of him.

C. Procedure

The design involved the collection of population-wide data for six public schools, three located in Maryland and three located in Georgia. All students completed the modified VPI, and the student cumulative record yielded intelligence data and criterion data on quality point average, number of unexcused absences, and number of disciplinary referrals. In addition, two classrooms per school were selected on a volunteer basis for additional data collection. In these special classrooms, the teacher supplied behavior ratings of the students on the Pupil Classroom Behavior Scale (PCBS) and students rated their teachers on the Maryland Instrument for Student Rating of Teachers (MISROT). For the six classrooms in Georgia schools, classroom achievement, unexcused absences, and disciplinary referrals were also obtained. The VPI data were obtained through mass testing sessions within the schools. For the special classrooms, a research assistant monitored the collection of all data.

Analyses were carried out at three levels, chosen to coincide with the major administrative divisions within a high school. These levels were: grades (10, 11, and 12), curricula (academic, general, etc.), and individual classrooms. Prior to data collection, the Holland VPI was modified so that only those items keyed on the six personality scales were retained. The PCBS was an avilable instrument developed for use with elementary school students; the only modification involved rewording one item. The MISROT was developed under this project from an analysis of teacher-classroom behavior. Each of the latter two instruments elicited responses on five point rating scales; the VPI was a forced choice instrument.

In general, correlational and discriminatory statistical techniques were utilized for all data analyses. For the six VPI scores per student, four different types of profile scores were defined. The analysis at the grade level involved validating these profile scores against the criterion variables by multiple correlations procedures. Also, the set of six VPI scores was validated against the criterion set by means of canonical correlation, extreme group discriminant analysis, and, in the case of quality point average, by multiple correlational procedures. At the curriculum level, the profile scores were redefined in terms of curriculum groups, and validity explored using multiple correlational techniques. At the classroom level, the PCBS and MISROT were each factor analyzed in order to develop and evaluate keying procedures. Validation of the VPI scores, the PCBS scores, and a combined set of scores involving the VPI, PCBS, MISROT, and intelligence data was carried out by multiple correlational techniques; also, step-wise regression analysis for the predictors was performed. Finally, canonical correlations were computed between the PCBS and MISROT, the VPI and PCBS, and the VPI and MISROT.

D. Results

The results are summarized here for each of the three research hypotheses.

1. First Hypothesis

Moderate correlations, in a range to account for 10 to 15% of the criterion variance, were obtained between the correlation-type profile scores and the criterion set. Profile scores based on staff (predominantly teachers) VPI mean scale scores were generally more related to the academic criterion set than were profile scores based on comparison with grade level student VPI mean scale scores. Using the six VPI scores, in lieu of the single profile scores, resulted in an increase of predictive power, with about 15 to 25% of the criterion variability accounted for in this way. From the discriminant analyses, it was found that VPI scores alone could correctly classify between 62 and 77% of students in extreme groups based on quality point average. Adding intelligence scores resulted in an increase of correct classifications to between 77 and 90%. For unexcused absences and disciplinary referrals, the discrimination situation was difficult due to the concentrations of 0 scores. When the six VPI scores were used as multiple predictors for quality point average over all students, between 2 and 19% of the variance in quality point average not predictable from intelligence scores was accounted for. In general, the VPI added most predictive power at the 11th and 12th grade levels where the correlation between intelligence scores and quality point average was lower.

The evidence lends credence to the hypothesis that a student's VPI personality type is related to his success in school. In terms of grade level comparisons, the VPI provides an useful, non-intellective predictor of achievement and, also, serves as a valid instrument for testing the reward expectancy model.

2. Second Hypothesis

Moderate multiple correlations, comparable to those obtained at the grade level, resulted when profile scores were validated against the criterion variable set for curriculum groups. However, the pattern of higher validity for staff-based profile scores, observed at the grade level, did not recur at this level. The results provided suggestive, but no conclusive, evidence for the validity of the reward expectancy model when students are organized by curriculum groups.

3. Third Hypothesis

The factor analysis of the PCBS revealed a structure for the sample of high school students which was unlike that found at the elementary school level. However, the factors isolated in this study were highly uninterpretable and the original, elementary school key was retained. In the case of the MISROT, the factor analysis suggested three factor-based scores and the instrument was keyed to yield scores of this type. Comparing the PCBS and MISROT by classroom groups, revealed that teachers and students tended to agree quite well in their ratings of one another.

In the three Georgia schools, prediction of classroom quality point average from the VPI resulted in a range of multiple correlation coefficients from .50 to .77. The range of similar coefficients using PCBS scores as predictors was .49 to .78. Thus, the VPI type of a student was as efficient a predictor of classroom achievement as the teacher's rating of the student's classroom behavior. A pattern of high Social and Intellectual scale scores, with low Realistic and Artistic scale scores from the VPI was found to be predictive of high classroom achievement.

In Maryland schools, using total quality point average as the criterion, the VPI was, again, a moderately good predictor, but not as good as the PCBS.

In general, high canonical correlations were found between the VPI and PCBS and the VPI and MISROT. For the VPI and PCBS, no distinct pattern was discernible on the canonical function. However, for VPI and MISROT, high Artistic scores were associated with specific MISROT profiles.

The results from the classroom level were confirmatory of the research hypothesis and suggested some of the dynamics underlying reward in the classroom.

E. Conclusions

1. The meaning of VPI scores from the point of view of their construct validity was clarified by the study of prediction of academic criteria.

2. The reward expectancy model received, at least, moderate support and encouragement for further research based on this model seemed warranted.

3. Among the practical implications of this study,

were suggestions for counselor use of VPI information.

4. Further research utilizing the reward expectancy model was suggested.

APPENDIX A

MODIFIED VOCATIONAL PREFERENCE INVENTORY

THE VOCATIONAL PREFERENCE INVENTORY

Modification of Sixth Revision

This is an inventory of your feelings and attitudes about many kinds of work. The only "right" answers are your frank opinions about the following list of occupations. Fill out your answer sheet by following the directions given below.

1. Show on your answer sheet the occupations which interest or appeal to you by completely filling in the blank under the 1.

2. Fill in completely the blank under the 2 for the occupations you dislike or find uninteresting.

3. Be sure to erase completely any answer you wish to change.

4. Use an ordinary lead pencil to mark your responses. Do not use an electrographic pencil or a pen.

5. Notice that the numbers on the answer sheet go from left to right, whereas the items on the back of this page go down. Do not let this confuse you. Be sure to match the appropriate item number with the corresponding number on the answer sheet.

6. Be sure to mark either 1 or 2 for each item on this form. Do not leave any blanks. If you are uncertain of your preference for a particular occupation, make the best judgment that you can.

1. Aviator
2. Private Investigator
3. YMCA Secretary
4. Detective
5. Post Office Clerk
6. Route Salesman
7. Electronic Technician
8. Humorist

9. Photographer
10. Interplanetary Scientist
11. Airplane Mechanic
12. Meteorologist
13. Foreign Missionary
14. Bookkeeper
15. Speculator
16. Poet

17. Fish & Wildlife Specialist
18. Biologist
19. High School Teacher
20. Quality Control Expert
21. Buyer
22. Symphony Conductor
23. Power Station Operator
24. Astronomer

25. Juvenile Delinquency Expert
26. Budget Reviewer
27. Stock & Bond Salesman
28. Musician
29. Master Plumber
30. Aeronautical Design Engineer
31. Speech Therapist
32. Traffic Manager

33. Manufacturer's Representative
34. Author
35. Power Shovel Operator
36. Anthropologist
37. Marriage Counselor
38. Statistician
39. Television Producer
40. Commercial Artist

41. Surveyor
42. Zoologist
43. Physical Education Teacher
44. Court Stenographer
45. Hotel Manager
46. Free Lance Writer
47. Construction Inspector
48. Chemist
49. Playground Director
50. Bank Teller
51. Business Executive
52. Musical Arranger
53. Radio Operator
54. Independent Research Scientist
55. Clinical Psychologist
56. Tax Expert

57. Restaurant Worker
58. Art Dealer
59. Filling Station Attendant
60. Writer of Scientific or technical articles
61. Social Science Teacher
62. Inventory Controller
63. Master of Ceremonies
64. Dramatic Coach

65. Tree Surgeon
66. Editor of a Scientific Journal
67. Director of Welfare Agency
68. IBM Equipment Operator
69. Traveling Salesman
70. Concert Singer
71. Tool Designer
72. Geologist

73. Assistant City School Superintendant
74. Financial Analyst
75. Real Estate Salesman
76. Composer
77. Locomotive Engineer
78. Botanist
79. Personal Counselor
80. Cost Estimator

81. Industrial Relations Consultant
82. Stage Director
83. Photoengraver
84. Scientific Research Worker
85. Psychiatric Case Worker
86. Pay Roll Clerk
87. Sports Promotor
88. Playwright

89. Electrician
90. Physicist
91. Vocational Counselor
92. Bank Examiner
93. Political Campaign Manager
94. Cartoonist
95. Funeral Director
96. Counter-Intelligence Ma

97. Architect
98. Shipping & Receiving Clerk
99. Criminal Psychologist
100. Insurance Clerk
101. Barber
102. Bill Collector
103. Ward Attendant
104. Masseur

APPENDIX B

PUPIL CLASSROOM BEHAVIOR SCALE AND SCORING KEY

PUPIL CLASSROOM BEHAVIOR SCALE
University of Maryland Pupil Services Project

Objectives of this Scale

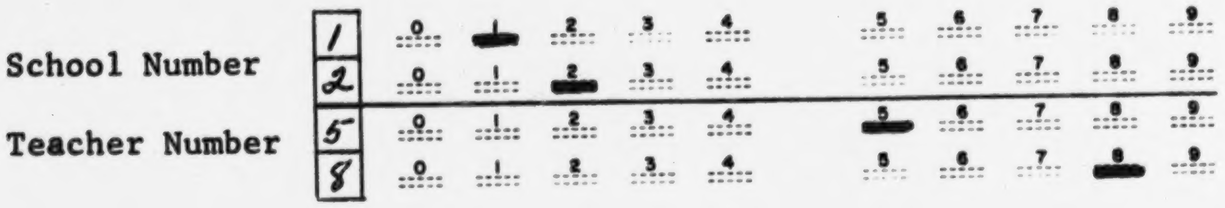
It has been shown that a teacher's professional judgment of a student's behavior is one of the most useful and valid sources of information about a pupil's growth and development. Your professional training and day-to-day experiences with children in work and play, in relaxed and stressful situations, have helped sharpen your judgment. Thus we would like to take advantage of your judgment in assessing the children you teach as one way of determining the characteristics of the children in the research schools. Data from each school will be programmed into a computer for comparison of all students as a school group with others.

INSTRUCTIONS

A. The behaviors on which we would like you to rate your students are printed on the attached pages. The number preceding each behavior corresponds to the number on the answer sheet.

B. This research is primarily concerned with the characteristics of groups of children in the schools. Therefore, give your best judgment of each child on the basis of the experience you have had with him or her, however much it has been, without spending too much time worrying about whether your response is exactly right. Few professional persons, no matter how well trained, can make ratings of others with absolute certainty and complete comfort. The fact that you may have inadvertently made an error with one child, or on further analysis and consideration might rate a few slightly differently, will not have much effect on computation for all the children taken together.

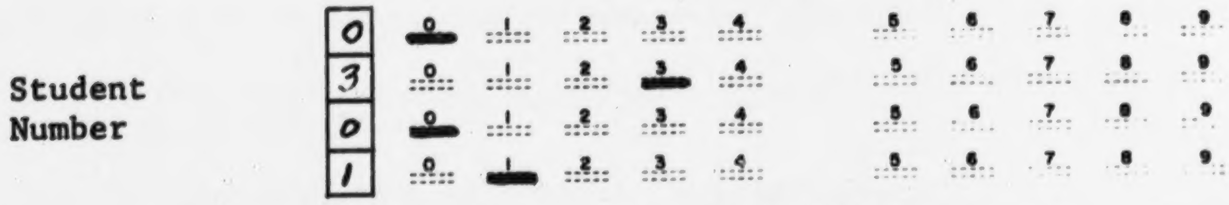
C. Please look at the enclosed answer sheets. Notice that there is space to rate 4 pupils on each answer sheet. At the top of each answer sheet there are spaces to mark your School Number and your Teacher Number. If your School Number were 12 and your Teacher Number were 58 you would mark as follows:



School Number	1	0	●	2	3	4	5	6	7	8	9
	2	0	1	●	3	4	5	6	7	8	9
Teacher Number	5	0	1	2	3	4	●	6	7	8	9
	8	0	1	2	3	4	5	6	7	●	9

D. There is also a space to write the pupil identification number of each pupil you rate. Four rows are shown on the answer sheet for the Student Number. Please write the pupil's number from top to bottom in the boxes as shown below. Then blacken in the corresponding spaces as shown in the following examples.

Pupil No. 0301



Student Number	0	●	1	2	3	4	5	6	7	8	9
	3	0	1	2	●	4	5	6	7	8	9
	0	●	1	2	3	4	5	6	7	8	9
	1	0	●	2	3	4	5	6	7	8	9

Remember that each student has a four-digit student number. Sometimes the first 1, 2, or even 3 digits may be zeros but these should be marked just like any other digit.

Pupil No. 5019

Student Number		0	1	2	3	4	5	6	7	8	9
	5	0	1	2	3	4	●	6	7	8	9
	0	●	1	2	3	4	5	6	7	8	9
	1	0	●	2	3	4	5	6	7	8	9
	9	0	1	2	3	4	5	6	7	8	●

E. Beginning with the first pupil on your class list rate this pupil on each behavior using the scale printed below:

1. **almost never or never**
2. **not very often**
3. **sometimes**
4. **quite often**
5. **most of the time**

F. After you have rated the first pupil on each behavior, then rate the next until all have been rated.

BEHAVIORS:

1. Comments on the work of other pupils by bringing out good points or suggesting improvements instead of being critical of their weaknesses and faults.

2. Contributes in ways that make class activities more interesting, varied and meaningful. (For example: brings in materials; relates personal experiences to activities; suggests ideas, plans, projects, solutions).

3. Acts upon helpful criticism in such ways as: correcting mistake; looking for other solutions; trying to better understand criticism; trying to make clear to others his reasoning.

4. Shows enthusiasm toward learning activities, being with classmates and, in general, being in school.

5. Cooperates with teacher requests for quiet, for starting work and for changing activities.

6. Blows up, becomes excited, and loses self-control when unable to do what he wants to do.

7. Uses available school time inefficiently.

8. Shows little concern for the needs, problems and feelings of others.

9. Tries out new things; puts ideas or things into new combinations. (Creativity may be seen in any subject matter area, in social, athletic, manual and fine arts areas. Examples are: the making up of a poem, art object, melody, story, chart, diagram, model, a solution to a social problem, a new football play).

10. Leads well toward socially desirable goals when given the chance to do so.

11. Follows well toward socially desirable goals when given the chance to do so.

12. Gives up when faced with a difficulty without trying to find a solution.

13. Hands in inaccurate or inadequate written work because he does not review or check work.

14. Has difficulty following teacher directions or instructions.

15. Is unable to keep attention for the necessary time on work tasks.

16. Disobeys or rebels against reasonable school authority (teachers, rules, regulations).

17. Gets into fights or quarrels with other pupils.

18. Has to be coaxed or forced to work or play with others.

19. Has difficulty in learning school subjects.

20. Makes unusual or inappropriate responses during normal school activities.

21. Works extremely hard in learning school subjects to the exclusion of any other interests or activities.

22. Behaves in ways which are dangerous to self or others.

23. Is unhappy or depressed.

24. Becomes upset or sick when faced with a difficult school problem or situation.

KEY FOR THE PUPIL CLASSROOM BEHAVIOR SCALE (PCBS)

Factor-Based Score	Name	Keyed Items
I	Achievement Orientation	7, 12, 13, 14, 15, 19
II	Socio-Academic Creative	1, 2, 3, 4, 9, 10
III	Socio-Cooperative	5, 6, 8, 11, 16, 17, 18, 20, 22, 23, 24

APPENDIX C

MARYLAND INSTRUMENT FOR STUDENT RATING OF TEACHER

UNIVERSITY OF MARYLAND

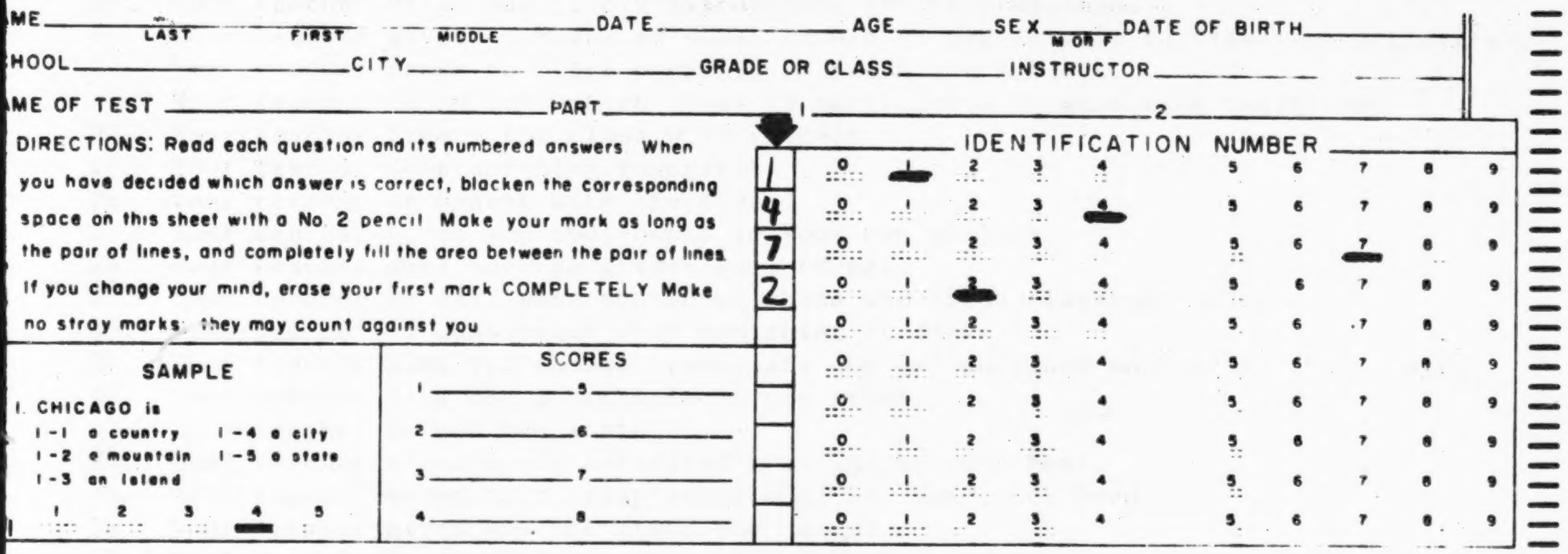
Maryland Instrument for Student Rating of Teachers

INSTRUCTIONS

This is an inventory of your feelings and opinions about the teacher in charge of the course you are attending right now. When reacting to each item on the test, think about this teacher and give your true feelings about this teacher. Your answers will be kept confidential and will not be shown to your teacher or to anyone connected with your school. The research assistant who distributed these materials to you will collect them later and they will be used for research purposes only.

On the top of your answer sheet, fill in your name, today's date, your age, sex, date of birth, the name of your school, and your grade. It is not necessary to fill in the spaces labeled "City," "Instructor," "Name of Test," or "Part."

When you have done this, locate the area labeled "Identification Number" on the upper, right side of the answer sheet. Using the top four lines, copy in the boxes the number which appears on the front of your test booklet. Then, blacken in the corresponding spaces to the right. The sample below will show you how the "Identification Number" should be marked:



ME______ LAST ______ FIRST ______ MIDDLE ______ DATE______ AGE______ SEX______ M OR F DATE OF BIRTH______

HOOL______ CITY______ GRADE OR CLASS______ INSTRUCTOR______

ME OF TEST______ PART______ 1______ 2______

DIRECTIONS: Read each question and its numbered answers. When you have decided which answer is correct, blacken the corresponding space on this sheet with a No. 2 pencil. Make your mark as long as the pair of lines, and completely fill the area between the pair of lines. If you change your mind, erase your first mark COMPLETELY. Make no stray marks; they may count against you.

IDENTIFICATION NUMBER

1
4
7
2

SAMPLE

1. CHICAGO is
1-1 a country
1-2 a mountain
1-3 an island
1-4 a city
1-5 a state

SCORES

1______ 5______
2______ 6______
3______ 7______
4______ 8______

When responding to items from the test booklet, mark your responses carefully by blackening in the space corresponding to your choice. Try to avoid marking any stray marks on the answer sheet, and be sure to fill in the entire space as shown in the sample on the answer sheet. When answering the items, use the following key:

Mark "1" if your response is "almost never or never"
Mark "2" if your response is "not very often"
Mark "3" if your response is "sometimes"
Mark "4" if your response is "quite often"
Mark "5" if your response is "most of the time"

When responding to the items, try to choose the response alternative which best describes your feelings about your teacher. However, do not spend too much time on any one item, since your first reaction is probably the most accurate one.

NOTE: The response spaces are numbered consecutively across the page rather than up and down the page. Be sure you are marking the correct space for each item on the test.

When you complete all of the items, place the test booklet and answer sheet on your desk and wait for the research assistant to collect your materials.

1. Your teacher speaks loudly enough for you to understand.
2. Your teacher speaks clearly enough for you to understand.
3. Your teacher speaks slowly enough for you to understand.
4. Your teacher uses language you can understand.
5. Your teacher uses language you approve of.
6. Your teacher has a good sense of humor.
7. Your teacher is humorous without offending anyone in class.
8. Your teacher does not spend too much time lecturing.
9. Your teacher does not use a threatening tone of voice or language.
10. Your teacher nearly always tells you things that make sense.
11. Your teacher does not say things which are untrue.
12. Your teacher does not say one thing at one time and something else at another time.
13. Your teacher does not show prejudice toward certain people or ideas.
14. Your teacher has a pleasant appearance.
15. Your teacher dresses well.
16. Your teacher has no nervous mannerisms.
17. Your teacher has the necessary physical coordination for all classroom activities.
18. Your teacher does not teach by reading from the textbook.
19. Your teacher requires only as much homework as is necessary.
20. Your teacher often has lively discussions in the classroom.
21. Your teacher gives everyone an equal chance to participate in classroom activities.
22. Your teacher comes to class prepared to teach the subject.
23. Your teacher helps the entire class to participate in answering questions.
24. Your teacher treats the class with respect.
25. Your teacher does not play favorites.
26. Your teacher is honest with the class.
27. Your teacher gives you confidence in your own ability.
28. Your teacher does not use grades as a threat.
29. Your teacher is fair when punishing those who break classroom rules.
30. Your teacher is consistent when punishing students.
31. Your teacher does not choose scapegoats who are punished more often than others.
32. Your teacher fits the punishment to the crime.
33. Your teacher is not too strict.
34. Your teacher seems to be satisfied when you do your best.
35. Your teacher seems to be displeased when you don't try hard.
36. Your teacher gives you the grade you earned.
37. Your teacher does not use grades to punish or reward.
38. Your teacher does not grade too hard.
39. Your teacher is not an easy grader.
40. Your teacher does not grade you one way at one time and another way at another time so that you don't know how to prepare for class or tests.
41. Your teacher does not make mistakes when averaging grades.
42. Your teacher grades you in such a way that you know from day to day pretty much where you stand.

APPENDIX D

VPI SCORING PROGRAM

```
C     PROGRAM VPISCORE
      DIMENSION MX(104),M(6),MOAN(6)
    1 FORMAT(A3,4X,A3,2X,64I1,/,12X,40I1,4X,9I2)
    2 FORMAT(2A3,2X,7(I2,1X),4X,3(I2,1X),4X,I3)
      DO 999 J=1,1500
      READ INPUT TAPE 5,1,ID1,ID2,(MX(I),I=1,104),MAB1,MAB2,MDR1,MDR2,MG
     1P1,MGP2,IQ1,IQ2,IQ3
      DO 88 I=1,6
   88 M(I)=0
      INF=0
      DO 99 I=1,10
   99 INF=MX(I)+INF
      DO 98 I=95,104
   98 INF=MX(I)+INF
      INF=INF-50
      INF=20-INF
      NN=11
      NM=89
      DO 96 K=1,6
      MOAN(K)=70
      DO 297 I=NN,NM,6
      CHA=I
      CHA=CHA/2.
      ICHA=CHA
      CAH=ICHA
      IF(CHA-CAH)97,200,97
  200 IF(MX(I))201,201,97
  201 MOAN(K)=MOAN(K)-5
      GO TO 297
   97 M(K)=MX(I)+M(K)
  297 CONTINUE
      NN=NN+1
   96 NM=NM+1
      DO 95 I=2,6,2
   95 M(I)=M(I)-MOAN(I)
      DO 823 I=1,6
  823 M(I)=14-M(I)
      CALL REDO(MAB1,MAB2,MBA)
      CALL REDO(MDR1,MDR2,MDR)
      CALL REDO(MGP1,MGP2,MGP)
      CALL REDO(IQ2,IQ3,IQ)
      IF(SIGNF(1.0,IQ1))62,61,61
   62 GO TO 999
   61 IQ=100+IQ
  999 WRITE OUTPUT TAPE 7,2,ID1,ID2,(M(I),I=1,6),INF,MBA,MDR,MGP,IQ
      CALL EXIT
      END
      SUBROUTINE REDO(M1B,M2B,MAB)
      IF(SIGNF(1.0,M1B))21,20,20
   21 GO TO 30
   20 IF(M1B)22,22,23
   22 M1B=10
      GO TO 30
   23 IF(M1B-9)32,33,32
   33 M1B=0
      GO TO 30
   32 IF(M1B-10)24,25,26
   25 M1B=20
      GO TO 30
   24 M1B=10*(M1B+1)
   GO TO 30
26 M1B=M1B+10
30 IF(SIGNF(1.0,M2B))41,40,40
41 GO TO 50
40 IF(M2B)42,42,43
42 M2B=1
   GO TO 50
43 IF(M2B-9)34,37,34
37 M2B=0
   GO TO 50
34 IF(M2B-10)44,45,46
45 M2B=2
   GO TO 50
44 M2B=M2B+1
   GO TO 50
46 M2B=(M2B+10)/10
50 MAB=M1B+M2B
   RETURN
   END
```

APPENDIX E

MISROT SCORING PROGRAM

```
C     PROGRAM SCOREMISROT
      DIMENSION ID(10),IX(42),IS(3),FMT(12),IG(12)
    1 FORMAT(12A6)
      READ INPUT TAPE 5,1,(FMT(I),I=1,12)
      DO 99 KK=1,1000
      READ INPUT TAPE 5,FMT,(ID(I),I=1,10),(IX(I),I=1,42),(IG(I),I=1,12)
      IS(1)=IX(1)+IX(2)+IX(3)+IX(4)+IX(6)+IX(8)+IX(10)+IX(14)+IX(18)+IX(
     120)+IX(22)+IX(24)+IX(26)+IX(30)+IX(32)+IX(34)+IX(36)+IX(42)-80
      IS(2)=IX(9)+IX(11)+IX(12)+IX(13)+IX(16)+IX(25)+IX(28)+IX(31)+IX(33
     1)+IX(37)+IX(38)+IX(39)+IX(40)+IX(41)-25
      IS(3)=IX(5)+IX(7)+IX(15)+IX(17)+IX(19)+IX(21)+IX(23)+IX(27)+IX(29)
     1+IX(35)
    2 FORMAT(10I1,3(2X,I3),2X,12I1)
   99 WRITE OUTPUT TAPE 7,2,(ID(I),I=1,10),(IS(I),I=1,3),(IG(I),I=1,12)
      CALL EXIT
      END
```

KEY FOR THE MARYLAND INSTRUMENT FOR STUDENT RATING OF TEACHERS (MISROT)

Factor-Based Score	Name	Keyed Items
I	Ideal Teacher-Image Conformity	1, 2, 3, 4, 6, 8, 10, 14, 18, 20, 22, 24, 26, 30, 32, 34, 36, 42
II	Fairness of Behavior	9, 11, 12, 13, 16, 25, 28, 31, 33, 37, 38, 39, 40, 41
III	Motivational Dynamicism	5, 7, 15, 17, 19, 21, 23, 27, 29, 35

APPENDIX G

PROFILE SCORING PROGRAM

```
C     PROGRAM PROFILE
      DIMENSION PMS(6),PMT(6),X(6),ID1(3),ID2(5),IX(6)
    2 FORMAT(6F4.2)
   55 FORMAT(I3)
    3 FORMAT(3I2,2X,6(F2.0,1X),I2,5X,3(I2,1X),4X,I3)
      DO 999 JOJ=1,10
      READ INPUT TAPE 5,55,NUM
      READ INPUT TAPE 5,2,(PMS(I),I=1,6)
      READ INPUT TAPE 5,2,(PMT(I),I=1,6)
      DO 999 JJ=1,NUM
      READ INPUT TAPE 5,3,(ID1(I),I=1,3),(X(I),I=1,6),(ID2(I),I=1,5)
      DO 10 I=1,6
   10 IX(I)=X(I)
      CALL REE(X,PMS,RMS,DMS)
      CALL REE(X,PMT,RMT,DMT)
    1 FORMAT(3I2,2X,6(I2,1X),1X,4I2,I3,2(1X,F5.2,1X,F7.2))
      WRITE OUTPUT TAPE 7,1,(ID1(I),I=1,3),(IX(I),I=1,6),(ID2(I),I=1,5)
     1,RMS,DMS,RMT,DMT
  999 CONTINUE
      CALL EXIT
      END
      SUBROUTINE REE(EX,EY,R,D)
      DIMENSION EX(6),EY(6)
      SX=0.
      SY=0.
      SSX=0.
      SSY=0.
      SXY=0.
      D=0.
      DO 101 I=1,6
      D=D+(EX(I)-EY(I))**2
      SX=SX+EX(I)
      SSX=SSX+EX(I)**2
      SY=SY+EY(I)
      SSY=SSY+EY(I)**2
  101 SXY=SXY+EX(I)*EY(I)
      DENOM=SQRTF((SSX-(SX**2)/6.)*(SSY-(SY**2)/6.))
      R=(SXY-(SX*SY)/6.)/DENOM
      RETURN
      END
```

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